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CHOICE OF FOODS
-allocation of time and money,
household production
and market services
PART II

Jens Bonke
Project no 12

Preface

Do households and individuals behave in a rational way, and, more specifically, do households choose foods with preparation rates in accordance with their time and money restrictions? These questions were raised, and some preliminary answers given in Part I (Bonke, 1992a) of this project. Here in Part II some further and more sophisticated statistical analyses are made. The overall results of the project seem to confirm the thesis of rational behaviour when households choose foods.

The project has to be regarded within the framework of home economics, which attempts to cast light on household activities. The author has earlier contributed to this subject in journals (Bonke, 1992b; Bonke, 1992c) and in discussion papers. A preliminary version of part I of this project was presented at the ACR-conference in Amsterdam, 1992, and part II was presented at the Association for Time Use Studies in Amsterdam, 1993.

The data-processing for the project has been carefully performed by Kristian Koktvedgaard.

The research work is part of the MAPP-programme (Market-based Process and Product Innovation in the Food Sector) and is carried out at the Institute of Economics at the University of Copenhagen.

*Jens Bonke,
Copenhagen, September 1993*

Executive Summary

1. This is the second report on a study investigating how demand for food products with varying degrees of convenience depends on disposable income and disposable time.
2. Both absolute and relative expenditures on convenient food decrease with disposable time and increase with disposable income, indicating rational economic behaviour. Expenditure on non-convenient food (preparation food), however, increases in absolute terms with increasing income, contrary to expectations. This may be explained by the fact that all categories of expenses increase with disposable income; this is supported by the fact that the relative expense on preparation food indeed falls with increasing income.
3. More children in the household generally mean less per-unit expenditure on both convenient and non-convenient food. This may be explained by economies of scale and by buying cheaper products. The probability of eating out decreases significantly with school children. Older individuals buy more non-convenient food and less convenient food than younger individuals. This confirms the thesis of more experience gained through life and consequently higher productivity in household production.
4. Degree of participation in the labour-market has an impact on food choice only in double-career families, who spend more on semi-preparation and fast lunch/breakfast foodstuffs. They seem to place special emphasis on convenient lunch.
5. Higher education goes along with more expenditures on semi-convenient food in Denmark. This contrasts with Sweden, where higher education leads to more expenditure on fast food. This may indicate a slower pace of modernisation of eating habits in Denmark than in Sweden.
6. Ownership of microwave ovens and dishwashers means more expenditure on fast meals. Ownership of a freezer means reduced expenses on most kinds of foodstuffs, possibly due to obtaining quantity discounts.
7. Ownership of household appliances and hiring domestic help decreases the probability of eating out.
8. Singles spend money on meals away from home more frequently than couples, whereas the spending on fast food and fast lunch/breakfast does not vary between singles and couples.
9. Gender is not a significant factor in relation to the purchase of convenient foodstuffs.

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1. Introduction

In a former report, part I (Bonke, 1992a), rationality in the choice of foodstuffs was analysed by constructing different regimes, to which households belong depending on their economic resources, time and money. The empirical work showed behaviour is rational to the extent that time-poor and money-rich households buy fast food and spend more money on eating out than time-rich and money-poor households. However, the pattern found was not as clear as was expected based on neo-classical economic theory. Because the food regimes were not quite comparable due to differences in socio-economic and demographic conditions, further empirical analysis of rational behaviour in choosing foodstuffs are undertaken in this part II of the project *Choice of Foods*.

Following a discussion of different models and variable transformations appropriate for empirical estimation, the effect of disposable time and disposable money on expenditure on different categories of foodstuffs will be analysed. Furthermore, some additional independent variables will be introduced with the purpose of obtaining better explanations and of investigating the significance of different predictor variables, including some proxy-variables of productivity.

Special attention is given to the preferences for meals away from home, for fast food and, for what is termed "quick lunch". Food regimes are defined by classifying households according to their expenditure on these foodstuffs, i.e. positive spending versus no spending. Subsequently, the remaining food categories are analysed to reveal possible differences in the spending of eating outers and non-eating outers, fast fooders and non-fast fooders, and quick lunchers and non-quick lunchers. Consequently the regimes do not correspond to those in part I.

Besides ordinary regression analyses, estimations are performed by probit procedures to make corrections for the sample selection bias due to the many households with no expenditure on the food categories *eating out*, *fast food* and *quick lunch/breakfast*.

The relationship between expenditure on eating out and fast food, and on eating "quick lunches" is analysed, among other things, to determine whether there is a special Danish lunch-box culture affecting the general pattern of food choice.

Finally, some separate estimations for couples and singles are performed to study the appropriateness of the equivalence scaling used in this project, i.e., the weighting of household members, and especially to analyse the implication of different life cycle positions for the choice of food.

All estimations are made on the basis of the Consumer Expenditure Survey, 1987.

Parts I and II of this project must be seen as a whole, which, among other things, implies that some information necessary for the understanding of this report is found in the former report, part I (Bonke, 1992a).

2. Models

In part I of this project, the choice of foods was studied by comparing households belonging to different regimes, specified by available economic resources. The findings indicated some rationality, showing among other things, that time-poor and money-rich households spend more on convenient food than do time-rich and money-poor households. However, the expenditure on the same category of foodstuffs did not differ significantly from regime to regime in statistical terms, which is partly explained by the specifications of the variables as well as by conditions related to the definitions of the regimes.

In this report, the choice of different kinds of foods - proxies for food regimes - is analysed by regression models, investigating the effect of the variables in part I together with additional variables. Both unit expenditure (adjusted for variations in household composition) and per cent expenditure (percentage of all food expenditures) are used as dependent variables, and various expressions of income and disposable time enter the analysis as independent variables. There are also productivity variables in some of the analyses¹.

Table 1. Explained variance of regressions of per unit and percent-wise expenditures with total unit consumption expenditures (UNITINC) and disposable time (DISPTIME) as independent variables

Adj. R ²	Dependent variables			
Independent variables UNITINC & DISPTIME	unit exp	Prepared meals (unitpm)	Semi-prepared meals (unitspm)	Fast food/ eating out (unitfmno)
		.0417	.0326	.0848
	per cent exp	Prepared meals (pctpm)	Semi-prepared meals (pctspm)	Fast food/ eating out (pctfmno)
UNITINC & DISPTIME		.0146	.0048	.0689

Table 1 shows that the explained variance, adjusted R², of all the models is rather low. The regressions using per unit expenditures as dependent variable explain relatively more variance than those using percent-wise expenditures, when using the total unit expenditures of consumption (UNITINC) and disposable time (DISPTIME) as dependent variables.

In regression analyses of consumer expenditure double logarithm transformations are often used to improve explained variance, and to estimate different kinds of elasticity. Such transformations lead to independence of scale specifications, which allows international comparisons.

¹For more explicit explanations of the variables, see table 11 in Part I (Bonke, 1992a).

Performing double logarithm regressions on the food expenditure data increases the amount of explained variance (table 2). However, because of the expenditure budget survey's recording period of only two weeks (see part I), there are many 0-expenditures in some food-categories, making it impossible to perform double logarithm transformations for many households. Adding a small positive value to all expenditures solves this problem; the results, however, become inaccurate, and the procedure leads to a decline in R^2 .

When performing linear regressions in a subset of observations, i.e., households with positive expenditure on certain foodstuffs, sample selection bias may arise. The size can be estimated by a probit analysis, showing the probability of belonging to a specific group - e.g., households eating away from home versus households eating only at home. This allows the calculation of bias-correction terms, which can then be integrated in the ordinary least square regressions of households with positive expenditure and no expenditure on the designated food category, respectively.

Table 2. Explained variance of regressions based on double logarithm transformations with total disposable income (LOGINC) and disposable time (LOGTIME) as independent variables

Adj. R ²	Dependent variables			
Independent variables LOGINC & LOGTIME	Households with expenditures >0	Prepared meals (logpm)	Semi-prepared meals (logspm)	Fast food/eating out (logfmno)
		.0637	.0335	.1077
LOGINC & LOGTIME	Households with expenditures +0.001	Prepared meals (logpm)	Semi-prepared meals (logspm)	Fast food/eating out (logfmno)
		.0761	.0511	.0479

The explained variance of expenditure on meals out for regressions with and without corrections based on probit analysis are shown in table 2. It can be seen that the adj. R^2 's are very similar, and more important, that there is no statistically significant selection bias, i.e., the t-value of λ is very small. Nevertheless, two-stage regressions are made with the special purpose of finding the probability of having expenditures on specified foodstuffs, and an extended description of the required procedure is given in chapter 6 .

Because of the problems in taking the logarithm of variables with many 0-observations, untransformed unit and percent expenditures are chosen as dependent variables in the following regressions. Since, however, the phenomenon of 0-observations is very infrequent for the independent variables *disposable income* and *disposable time*, and in order to get more appropriate interpretations, it was decided to perform semi-logarithm regressions.

Table 3. Explained variance of an uncorrected and a probit-corrected regression with disposable income less housing expenditure (LOGVINC) and disposable time (DISPTIME) as independent variables

Adj. R ²	Households with expenditure >0	
	Dependent variables	Probit correction
Independent variables	Meals out (logmo)	Meals out (logmo)
LOGVINC & LOGTIME	.0970	.0960 ($\lambda, t: -0.504$)

Table 4 shows the explained variance provided by semi-logarithm models. It turns out that explained variance rises a little when housing expenditures are subtracted from disposable income (LOGVINC) before entering it in the equation. Therefore, this variable will be used in the following.

Table 4. Explained variance of regressions based on semi-logarithm transformations with total disposable income inclusive (LOGINC) and exclusive (LOGVINC) housing expenditure, respectively, and disposable time (LOGTIME) as independent variables

Adj. R ²	Dependent variables			
	unit expenditure	Prepared meals (unitpm)	Semi-prepared meals (unitspm)	Fast food/eating out (unitfmno)
Independent variables				
LOGINC & LOGTIME		.0546	.0358	.0786
LOGINC & LOGTIME		.0686	.0442	.0929
LOGINC & LOGTIME	per cent expenditure	Prepared meals (pctpm)	Semi-prepared meals (pctspm)	Fast food/eating out (pctfmno)
LOGINC & LOGTIME		.0167	.0055	.0757
LOGINC & LOGTIME		.0164	.0064	.0833

When the results of the regression analyses are displayed in the following, some independent variables are sometimes excluded, the purpose being to draw attention to the main correlations in the applied food choice models.

3. Disposable income and disposable time

Neo-classical theory assumes that households allocate their economic resources rationally, which in the case of foodstuffs implies that money-rich and time-poor households choose more convenient foods than money-poor and time-rich households do, and vice versa for the choice of non-convenient foods.

The thesis is generally confirmed in table 6, where **unit** expenditure and **per cent** expenditure on convenient foods are positively related to the logarithm of disposable income, and negatively related to disposable time. The unit and per cent expenditures on non-convenient food are positively related to disposable time. However, only per cent expenditure on non-convenient foods is negatively related to disposable income, whereas the theory is not verified for unit expenditure. All coefficient are significant at the 0.001-level.

Lindvall (1989, p. 109) has the same findings for main meals in Sweden. The percentage expenditure on preparation food is negatively affected by income, whereas the absolute unit expenditure is positively affected, which Lindvall explains by the fact that expenditure on preparation food increases with income, e.g., by purchases of more expensive foodstuffs. Expenditure on other goods, however, also increases with income, which is why the per cent expenditure on preparation foods decreases. These other goods could, e.g., be food from other categories. This has been confirmed for Denmark, where it was found that with increasing income, percent-wise expenditures on non-convenient food are substituted by convenient food (table 6).

The percent expenditure on semi-convenient food does not vary significantly with income, whereas unit expenditure does.

The overall conclusion is that households seem to behave rather rationally by spending relatively less money on non-convenient food and more on convenient food, the more money-rich and time-poor they are. Nevertheless, the regression models explain only a minor part of the variance between households, $\text{adj.}R^2$ of 8-15%, which means that other variables, including non-economic ones, may be significant when explaining food choice behaviour.

More than one third of food expenditure goes into main meal products (table 5), and not surprisingly table 7, which repeats the analysis from table 6 for main meal expenditures only, shows a pattern corresponding to the one above. Expenditure on fast food and meals out increases with disposable income and decreases with disposable time, which is the case for unit expenditure as well as for per cent expenditure. Unit expenditure on preparation meals increases with both disposable time and disposable income, just as was found for the total non-convenient category in table 6. In contrast to table 6, the relationship between percent expenditure on preparation meals and disposable income is positive, but it is not statistically significant.

Numerically, the coefficients in table 7 are about half the size of analogous coefficients in table 6. Nevertheless, there is one major exception, viz. the relationship between disposable time and unit expenditure on fast food plus meals out. The estimated coefficient is nearly the same as that for all convenient foodstuffs in table 6. The figures seem to disclose that obtaining more disposable time primarily affects the main meal menus.

Table 5. Unit and per cent expenditure on different food categories - means and relative standard deviations

(N:1247)	unit expenditure			per cent expenditure		
	non-conv.	semi-conv.	conv.	non-conv.	semi-conv.	conv.
	1987-DKK			per cent		
Main meals:	3078 (0.78)	372 (1.10)	1247 (1.66)	24.40 (0.52)	3.07 (1.01)	9.67 (1.33)
Lunch/ breakfast:	2661 (0.59)	1264 (0.66)	407 (2.62)	23.04 (0.46)	11.01 (0.55)	3.23 (2.28)
Snacks:						
SN1(Biscuits, cakes, sweets)			1493 (0.83)			12.55 (0.69)
SN2 (Fruit)			638 (1.55)			5.25 (1.05)
All:	6596 ¹ (0.54)	1653 (0.61)	3787 (0.80)	55.04 ¹ (0.29)	14.23 (0.47)	30.72 (0.55)

¹ Including accessory stuffs
() relative standard deviations

Table 6. Unit and per cent expenditures on different food-categories explained by log of disposable income excl. housing (LOGVINC) and log of disposable time (LOGTIME)

(N:1246)	Unit expenditure		Per cent expenditure	
	B	RSD	B	RSD
Non-convenient food:				
CONSTANT	-28806. a	0.119	0.638 ^a	0.241
LOGVINC	2387.254 a	0.096	-0.071 ^a	0.143
LOGTIME	1374.300 a	0.230	0.104 ^a	0.135
Adj.R ²	0.0866		0.0804	
Semi-convenient food:				
CONSTANT	-6896.493 a	0.140	0.152 ^c	0.442
LOGVINC	691.621 a	0.093	-0.007	0.629
LOGTIME	142.464	0.625	0.010 ^d	0.604
Adj.R ²	0.0831		0.0029	
Convenient food:				
CONSTANT	-15956. a	0.176	0.209	0.766
LOGVINC	2590.918 a	0.073	0.078 ^a	0.136
LOGTIME	-1307.315 a	0.198	-0.115 ^a	0.129
Adj.R ²	0.1535		0.0894	

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

Table 7. Unit and per cent expenditures on main meal foodstuffs explained by log of disposable income excl. housing (LOGVINC) and log of disposable time (LOGTIME)

(N:1246)	Unit expenditure		Per cent expenditure	
	B	RSD	B	RSD
preparation meals:				
CONSTANT	-17572. ^a	0.135	-0.170	0.743
LOGVINC	1468.177 ^a	0.106	0.004	2.297
LOGTIME	677.059 ^b	0.318	0.055 ^a	0.209
Adj.R ²	0.0686		0.0164	
semi-preparation meals:				
CONSTANT -	2320.426 ^a	0.172	-0.066 ^c	0.465
LOGVINC	204.793 ^a	0.131	0.005 ^c	0.417
LOGTIME	66.226 ^d	0.557	0.007 ^c	0.431
Adj.R ²	0.0442		0.0064	
fast food and meals out:				
CONSTANT	-4064.982 ^c	0.485	0.229 ^d	0.536
LOGVINC	1181.543 ^a	0.112	0.047 ^a	0.174
LOGTIME	-1149.217 ^a	0.158	-0.097 ^a	0.116
Adj.R ²	0.0929		0.0833	

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

For the unit expenditure models, the explained variance is rather low with adj.R² of 4.4-9.3%, which is half of the adj.R² calculated on Swedish data by Lindvall (1989). When comparing Danish and Swedish unit expenditures (where the categories do not contain quite the same material) on fast food and meals out, and on preparation meals, by estimating income-elasticities for the average income household, lower numbers are found for Sweden than for Denmark, i.e., 0.64 and 0.93 for fast food and meals out, and 0.26 and 0.37 for preparation meals. In other words, as preparation meals are basic foods, and fast food and meals out are considered more of a luxury by consumers in both countries, the spending on the two categories of foodstuffs are affected more by changing income in Denmark than in Sweden.

Another considerable expenditure group covers lunch and breakfast foodstuffs (table 8). Again the pattern of increasing expenditure on fast food with disposable income, and decreasing expenditure with disposable time, repeats itself. Likewise, increasing expenditure on preparation food follows an increase in both kinds of economic resources. However, the interpretation of the fast lunch and breakfast categories has to be cautious, because they only include canteen expenditure etc. which amount to only 3.2% of the total foodstuff expenditures (table 5).

The unit expenditure on semi-preparation lunch and breakfast increases with income, while per cent expenditure decreases, which may be explained by the more pronounced increase in spendings on foodstuffs or goods in general, rather than an effect peculiar to this category.

Table 8. Unit and per cent expenditures on lunch/breakfast foodstuffs explained by log of disposable income excl. housing (LOGVINC) and log of disposable time (LOGTIME)

(N:1246)	Unit expenditure		Per cent expenditure	
	B	RSD	B	RSD
preparation lunch/breakfast:				
CONSTANT	-7604.271 ^a	0.205	0.618 ^a	0.168
LOGVINC	704.394 ^a	0.148	-0.052 ^a	0.132
LOGTIME	378.500 ^b	0.380	0.027 ^b	0.345
Adj.R ²	0.0369		0.0508	
semi-preparation lunch/breakfast:				
CONSTANT	-4496.861 ^a	0.182	0.217 ^a	0.278
LOGVINC	472.948 ^a	0.116	-0.012 ^b	0.320
LOGTIME	84.623	0.893	0.004	1.222
Adj.R ²	0.0549		0.0069	
fast lunch and breakfast:				
CONSTANT	419.010	2.473	0.131 ^d	0.542
LOGVINC	365.624 ^a	0.190	0.022 ^a	0.210
LOGTIME	-603.745 ^a	0.159	-0.052 ^a	0.126
Adj.R ²	0.0542		0.0667	

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

Table 9. Unit and per cent expenditure on snacks explained by log of disposable income excl. housing (LOGVINC) and log of disposable time (LOGTIME)

(N:1246)	Unit expenditure		Per cent expenditure	
	B	RSD	B	RSD
SN1 (Biscuits, cakes, sweets):				
CONSTANT	-10209. ^a	0.117	-0.160 ^d	0.537
LOGVINC	824.162 ^a	0.097	0.014 ^c	0.414
LOGTIME	396.642 ^a	0.277	0.019 ^c	0.401
Adj.R ²	0.0823		0.0072	
SN2 (Fruit):				
CONSTANT	-2100.841 ^c	0.470	0.010	5.441
LOGVINC	219.588 ^a	0.302	-0.004	0.770
LOGTIME	49.002	1.864	0.014 ^b	0.364
Adj.R ²	0.0072		0.0065	

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

The final expenditure category is snacks, including biscuits, cakes, sweets (SN1) and fruit (SN2). For the first sub-group it was found that unit expenditure and per cent expenditure increase with disposable income and disposable time, indicating that more money as well as more time spell more snacks, although the variation in income explains more of the variance in unit expenditure than the variation in time.

Unit expenditure on fruit increases with disposable income, whereas disposable time does not matter significantly. However, per cent expenditure on fruit increases with disposable time (table 9). Therefore neither fruit nor ordinary snacks are considered time saving strategies in fulfilling nutrition needs.

The conclusion of this chapter is that households spend more money on main meal and lunch/breakfast convenient foodstuffs and less on analogous non-convenient foodstuffs, when disposable time is restricted, and relatively more on main meal and lunch/breakfast convenient foodstuffs, when they have enough money. Consequently, households seem to behave in a mainly economically rational way. The handling of time resources follows the thesis about the time buying strategy substituting non-convenient foodstuffs by convenient ones set forth in part I (Bonke, 1992a, chapter 4).

In the following, other time-buying and time-saving strategies of households, as well as other factors determining the choice of foodstuffs, are investigated.

4. Modified time and income models

Tables 10 to 16 show unit expenditure on different categories of foodstuffs by the number of persons in the household, the presence of pre-school or school children and working hours and educational level (i.e., of the wife in couples). In this way variables that determine disposable time (part I p. 40) are enclosed. Not surprisingly, only moderate deviations in explanatory power compared to those found in the chapter above are found, (see also the adj.R² in tables A1, A2 and A3 in the appendix).

The explained variance found here is slightly higher for semi-convenient food and convenient food and their sub-categories, and somewhat lower for non-convenient food and its sub-categories.

The results for per cent expenditure are not presented, because of even lower levels of explained variance.

Table 10. Unit expenditure on different food-categories explained by disposable income and determinants of disposable time

(N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
CONSTANT	-19701. ^a	0.130	-5756.279 ^a	0.123	-24826. ^a	0.083
LOGVINC	2334.897 ^a	0.099	658.570 ^a	0.097	2676.145 ^a	0.070
COUPLES	780.737 ^c	0.458	-70.111	1.417	-625.488 ^c	0.464
CHILD	-105.824	1.808	104.825 ^c	0.508	-294.072 ^d	0.528
CHILDP	-28.619	14.909	92.349	1.284	321.886	1.076
CHILDS	332.944	1.194	36.253	3.048	-125.318	2.577
PARTTIME	43.108	8.536	57.604	1.775	-466.628	0.640
FULLTIME	115.137	2.837	107.657	0.843	47.950	5.535
EDUTIME	-1.752	47.127	13.387	1.714	-5.369	12.493
Adj.R ²	0.0794		0.0971		0.1602	

^{abcd}Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

A particular finding in these models is that being a couple rather than single increases unit expenditure on non-convenient food, in contrast to decreasing expenditure on convenient food, see table 10. Considering the expenditure on the sub-groups of foodstuffs in table 11, these findings are confirmed for expenditure on both main meal foodstuffs and lunch/-breakfast food, though only the correlation of the convenient food categories are significant. Couples seem to be more home-oriented than singles in their food pattern, bearing in mind that expenditure is unit based, i.e., corrected for the number and the age of children in the household, and disposable income is minus housing expenditures (LOGVINC), i.e., equal to potential variable consumption.

In chapter 7, an attempt is made to shed more light on this issue by analysing the correlation between some structural variables and expenditure on different food categories separately for couples and singles.

In table 11, another interesting finding appears, viz. that biscuits, cakes, sweets (SN1) are positively related to marital status in the way that individuals in couples buy more of these snacks than singles. The explanation may be that eating these foodstuffs is subordinate to social events, rather than a compensation for being alone.

Table 11. Couples (COUPLES) and unit expenditure on different food categories

COUPLES ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Main meals: Lunch/ breakfast:	386.892	0.627	28.496	1.457	-407.221 ^c	0.498
Snacks: SN1 SN2	264.894	0.611	-90.367	0.930	-388.960 ^a	0.276
					216.631 ^d	0.568
					-45.937	2.235

¹Beside the variable COUPLES, LOGVINC, CHILD, CHILDPR, CHILDS, PARTTIME, FULLTIME, EDUTIME are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficients; RSD: relative standard deviation

Table 12. Children (CHILD) and unit expenditure on different food categories

CHILD ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals: Lunch/ breakfast:	-156.314	0.832	-27.271	0.815	-229.428 ^c	0.473
Snacks: SN1 SN2	49.414	1.755	136.325 ^b	0.330	-100.503 ^d	0.573
					40.069	1.645
					-4.210	13.068

¹Besides the variable CHILD, LOGVINC, COUPLES, CHILDPR, CHILDS, PARTTIME, FULLTIME, EDUTIME are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficients; RSD: relative standard deviation

The effect of having children on foodstuff expenditure is illustrated in table 10, where a positive relationship is found for the semi-convenient category, which appears to be explained by the sub-group lunch/breakfast, containing bread, milk products, cereals, etc. (table 12). For nearly all other categories the relationships are negative, which indicates that the more children there are in a household, the less the unit expenditure on convenient food as well as

on non-convenient food. The explanation should be that economies of scale are realised and/or that cheaper foodstuffs are bought, the more members there are in the household.

Tables 13 and 14 illustrate that both households with pre-school children and households with school children buy more semi-prepared stuffs for the main meal than households with no children. At the same time, having school children especially means less expenditure on fast food and on eating out, even when correction is made for the number of children, working hours, the educational level and disposable income. The semi-preparation food category consists of panned, processed, and preserved foods, and choosing more from this category with pre-school or school children in the household may be seen as a moderate modernisation of meal preparation in the household, partly substituting the fast food and eating out categories.

Having pre-school or school children in households also increases expenditure on the two kinds of snacks (biscuits, cakes & sweets, and fruit), though mostly in the first snack category, and mainly in pre-school child families.

Table 13. Pre-school children (CHILDPR) and unit expenditure on different food categories

CHILDPR ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	184.032	1.576	84.113 ^d	0.589	-220.587	1.097
Lunch/ breakfast:	-184.931	1.046	6.097	16.474	63.089	2.038
Snacks:						
SN1					316.924 ^c	0.463
SN2					162.460	0.755

¹Besides the variable CHILDPR, LOGVINC, COUPLES, CHILD, CHILDSC, PARTTIME, FULLTIME, EDUTIME are included in the regression models.

abcdSignificant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

Table 14. School children (CHILDSC) and unit expenditure on different food categories

CHILDSC ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	269.216	1.004	98.761 ^a	0.467	-356.325	0.633
Lunch/ breakfast:	40.677	4.431	-62.104 ^a	1.506	-65.988	1.815
Snacks:						
SN1					179.234	0.764
SN2					117.761	0.970

¹Besides the variable CHILDSC, LOGVINC, COUPLES, CHILD, CHILDPR, PARTTIME, FULLTIME, EDUTIME are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

Participation in the labour market and the number of working hours affect food choice noticeably only in so-called double-career families, who spend more on semi-preparation and fast lunch/breakfast foodstuffs than couples where the wife is part-time or non-working and single households. The reason may be that more emphasis is put on lunch, consequently increasing expenditure on items from these convenient categories.

Table 15. Part-time working wife (PARTTIME) and unit expenditure on different food categories

PARTTIME ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	-18.442	13.569	9.458	4.522	-196.990	1.060
Lunch/ breakfast:	-57.145	2.919	38.673	2.239	-1.328	83.518
Snacks:						
SN1					-229.297 ^d	0.553
SN2					-39.012	2.711

¹Besides the variable PARTTIME, LOGVINC, COUPLES, CHILD, CHILDPR, CHILDSC, FULLTIME, EDUTIME are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

Table 16. Full-time working wife (FULLTIME) and unit expenditure on different food categories

FULLTIME ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	-32.623	6.810	14.642	2.593	-81.747	2.267
Lunch/ breakfast:	42.867	3.455	90.753	0.847	179.515 ^d	0.548
Snacks:						
SN1					-79.370	1.418
SN2					29.553	3.178

¹Besides the variable FULLTIME, LOGVINC, COUPLES, CHILD, CHILDPR, CHILDSC, PARTTIME, EDUTIME are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficient; RSD: relative standard deviation

It is also noticeable that families where the wife works part-time, spend significantly less money on snacks excluding fruit, maybe because of a less time-restrained every day life.

The conclusion is that the models presented here offer further information as to how the determinants of disposable time explain spending behaviour on foodstuffs with different levels of convenience.

5. Productivity

Household production is more or less efficient, depending on the scale of production, the experience and education of the producers, the technical equipment available, and the surrounding conditions. All these factors will affect the choice of foodstuffs with varying degree of preparation. Below, disposable time is therefore substituted by the age and the educational level (in couples, the wife), the unit-variable, i.e., the weighted number of individuals in the household (see part I, Bonke, 1992a), the number of household appliances (microwave oven and/or dishwasher), expenditure on household servant, the urbanisation level of the surroundings, and home ownership. The variables of age and unit cost constitute life-cycle characteristics.

Table 17. Unit expenditures on different food categories explained by disposable income and determinants of household productivity

(N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
CONSTANT	-24823. ^a	0.111	-5847.917 ^a	0.134	-19852. ^a	0.113
LOGVINC	2569.551 ^a	0.091	663.315 ^a	0.101	2427.344 ^a	0.079
AGE	56.802 ^a	0.144	-2.359	0.991	-25.557 ^a	0.262
UNITC	952.021 ^a	0.256	170.604 ^c	0.409	-490.272 ^c	0.407
EDUTIME	-49.431	1.643	16.193	1.434	-15.800	4.207
APPL	38.901	5.654	57.076	1.102	-14.074	12.791
TSS1	-929.416 ^c	0.418	-41.010	2.710	212.887	1.494
URBAN	-194.014 ^c	0.432	-21.378	1.122	-276.359 ^a	0.248
OWNREN	-241.626	1.075	-48.681	1.527	-519.866 ^c	0.409
Adj.R ²	0.1192		0.0856		0.1845	

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficients; RSD: relative standard deviation

The age (AGE) of the housekeeper (the wife in couples) is anticipated to affect productivity positively, because experience is gained throughout life. This is anticipated to influence the choice of foodstuffs in such a way that older individuals buy more non-convenient food and less convenient food than younger individuals. This pattern is confirmed in table 17, and table 18 shows that it holds for main meal food, lunch/breakfast foodstuffs, and snacks (SN1).

Assuming that the unit variable is estimated in the most appropriate way (see part I), we have an economy of scale parameter, indicating that more individuals in the household give rise to more economic household production, and thereby less expenditure on foodstuffs for preparation. The same is assumed for expenditures on semi-prepared foodstuffs and prepared foodstuffs, which is why the overall unit expenditure (prepared, semi-prepared and non-prepared) decreases with the number of units in the household.

Table 18. Age (AGE) and unit expenditure on different food categories

AGE ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Main meals: Lunch/ breakfast:	27.724 ^a	0.201	0.306	3.173	-9.737 ^c	0.487
Snacks:	19.610 ^a	0.191	-2.414	0.823	-11.488 ^a	0.217
SN1					-8.976 ^b	0.320
SN2					4.645 ^d	0.516

¹Besides the variable AGE, LOGVINC, UNITC, EDUTIME, APPL, TSS1, URBAN, OWNREN are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficients; RSD: relative standard deviation

However, there are positive regression coefficients between units and expenditures on non-convenient and semi-convenient foodstuffs, while a negative correlation of convenient foodstuffs is found (table 17), which all in all demonstrates some dis-economies of scale.

The explanation may be either that the weights used here underestimate the extra cost of additional household members, i.e., the weights do not adequately compensate for economies of scale in the food chain, or that the dis-economies are caused by different food regimes, i.e., couples belong to more expensive regimes than single households, and households with children to more expensive food regimes than childless households.

Distinction between different kinds of meals gives another picture. For the main meal, we find higher expenditure on preparation and semi-preparation foodstuffs, and less expenditure on fast food and meals out, but the total amount declines, which follows the prediction of economies of scale in this meal type, which is the most numerous, see table 5.

Table 19. Weight units of household members (UNITC) and unit expenditure on different food categories

UNITC ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals: Lunch/ breakfast:	448.751 ^b	0.372	55.465 ^d	0.522	-717.126 ^a	0.198
Snacks:	291.010 ^b	0.384	119.036 ^c	0.498	-221.305 ^b	0.335
SN1					323.563 ^a	0.265
SN2					124.595 ^d	0.575

¹Besides the variable UNITC, LOGVINC, AGE, EDUTIME, APPL, TSS1, URBAN, OWNREN are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

B: regression coefficients; RSD: relative standard deviation

Lindvall (1989) found that Swedes with a higher education buy more fast food than lower educated Swedes, who in turn buy most non-prepared foodstuffs. The same finding is not obtained here, even when education is used as a dummy-variable, while expenditure on non-prepared food declines with higher levels of education (EDUTIME), the relationship to expenditures on fast meals and meals out (comparable to Lindvall’s fast food category) is insignificant (table 20). Danes’ expenditures on semi-preparation food increase with education, which may be interpreted as a more modest modernisation of the Danish food pattern compared to the internationalisation of the Swedish way of eating. Understanding these phenomena and the relationship to education requires more research work.

Table 20. Education (EDUTIME) and unit expenditure on different food categories

EDUTIME ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	-56.447	0.984	11.124	0.867	-3.495	13.491
Lunch/ breakfast:	-20.884	1.784	7.849	2.513	-18.110	1.365
Snacks:						
SN1					19.257	1.483
SN2					-13.451	1.772

¹ Besides the variable EDUTIME, LOGVCON, AGE, UNITC, APPL, TSS1, URBAN, OWNREN are included in the regression models.

The standard and the number of household appliances determine production conditions, and following the discussion in part I (Bonke, 1992a) save time in production, which allows more production in the same period of time (Bonke, 1988). Here, the time-saving strategy is measured by the possession of the appliances, microwave oven and/or dishwasher (APPL), and it was found that ownership of these appliances result in an increase in expenditure on non-prepared main meal foodstuffs and semi prepared lunch/breakfast stuffs (though there should be no reason for buying more bread, milk products and cereals), and in a decline in expenditure on fast lunch/breakfast. However, none of the correlations are significant (table 21).

In table 22, a separation of the expenditures on fast meals and meals out is made, which results in a positive correlation between the possession of appliances and foodstuffs for fast meals. Taking the appliances one by one, it was found that the possession of a microwave oven (APPL1) entails more expenditure on fast meals, just as the possession of a dishwasher (APPL3), while the possession of a freezer (APPL2) diminishes expenditure on fast meals, and even more the expenditure on meals out. However, ownership of a freezer also entails a decline in expenditure on preparation and semi-preparation meals, which could partly be due to quantity discounts obtained.

As expected, the relationship between owning a microwave oven and semi-preparation foodstuffs is positive, because these items, just as fast meals, are appropriate for processing with this kind of technology. The correlation between owning a dishwasher and expenditure

on preparation meals is also positive, because preparation of food requires more semi-durables, which have to be cleaned. Preferences for these kinds of meal therefore lead to investments in time-saving appliances.

For all the regressions performed, no significant coefficients were found, however, which is why the findings and argumentation have to be regarded with some reservation.

Table 21. Appliances (APPL) and unit expenditure on different food-categories

APPL ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	98.843	1.522	12.545	2.082	7.508	17.009
Lunch/ breakfast:	-19.805	5.096	47.340	1.128	-44.468	1.506
Snacks:						
SN1					62.574	1.236
SN2					-39.688	1.627

¹Besides the variable APPL, LOGVINC, AGE, UNITC, EDUTIME, TSS1, URBAN, OWNREN are included in the regression models.

Table 22. Different kinds of appliances¹ (APPL, APPL1, APPL2, APPL3) in the household and unit expenditure on different food categories

(N:1246)	prep.meals	semi-prep.	fast meals	:	fast meals	meals out
	B/(RSD)	B/(RSD)	B/(RSD)	:	B/(RSD)	B/(RSD)
APPL	98.843 (1.522)	12.545 (2.082)	7.508 (17.009)	:	55.079 (0.878)	-47.571 (2.474)
Adj.R ²	0.0917	0.0463	0.1110	:	0.0274	0.0914
APPL1	14.657 (17.035)	72.979 (0.593)	28.040 (7.556)	:	54.554 (1.471)	-26.513 (7.369)
APPL2	-163.796 (1.137)	-23.942 (1.349)	-201.004 (0.786)	:	-51.317 (1.167)	-149.686 (0.974)
APPL3	136.307 (1.143)	22.127 (1.221)	-14.154 (9.343)	:	39.789 (1.259)	-53.943 (2.260)
Adj.R ²	0.0911	0.0477	0.1108	:	0.0263	0.0908

¹ Besides the variables APPL and APPL1, APPL2, APPL3, respectively, the variables LOGVINC, AGE, UNITC, EDUTIME, TSS1, URBAN, OWNREN are included in the regression models.

The appliance-variables are dummies (appliances owned =1, else =0); APPL: microwave and/or dishwasher, APPL1: microwave, APPL2: freezer, APPL3: dishwasher.

Another time-saving strategy from the point of view of household members is to hire domestic help. Earlier, this strategy was considerably more common in many families, because of the favourable ratio between the husband's wage rate and that of the servant. However, increased economic equality has made it less favourable, and made it more appropriate to do the work oneself. Positive correlations are found between paying a servant and disposable income (part I, table 12). Nowadays, the prevalence of double-career families makes the question of choosing the most appropriate time-saving strategy, or a combination of them, more relevant, and investments in appliances seem to be preferred rather than hiring servants, i.e., having registered spending on that service, which is the case for only 6% of the households.

Surprisingly, we find that hiring domestic help is positively correlated with expenditure on fast food and meals out, and that the correlations with semi-convenient and especially non-convenient food are negative. Also, the correlation between lunch/breakfast foodstuffs and hiring servants is negative. The reason may be that servants mostly do other tasks than preparing food, i.e., taking care of children, while the parents prepare the food or eat away from home.

Table 23. Servants (TSS1) and unit expenditure on different food categories

TSS1 ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	-535.451 ^c	0.496	-81.674 ^d	0.565	394.121 ^d	0.572
Lunch/ breakfast:	-317.367 ^d	0.562	40.522	2.330	57.957	2.042
Snacks:						
SN1					-115.422	1.184
SN2					-123.769	0.922

¹Besides the variable TSS1, LOGVINC, AGE, UNITC, EDUTIME, APPL, URBAN, OWNREN are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

No significant inter-regional deviation in food prices is anticipated in Denmark. However, urbanisation may affect the prices due to transportation costs and various market conditions, which, ceteris paribus, implies higher prices and preparation rates of food supplied in big towns than in small ones. In addition, black economy seems to be more pronounced in rural areas, which may result in lower prices, which is also an argument for finding lower expenditures on foodstuffs in rural areas than in urban areas.

In table 24 these expectations are confirmed, finding less expenditures on all kinds of foodstuffs as the area gets more rural (URBAN: size of the biggest town in the district, scaled;1-4, declining²), see also Bonke (1988). The expenditure on preparation foodstuffs declines significantly and even more than expenditure on fast food and eating out, and also semi-prepared foodstuffs, fast lunch/breakfast and expenditure on snacks are lower in rural than in urban areas.

² In part I table 11, this variable is stated as growing. This is incorrect.

Table 24. Urbanisation (URBAN) and unit expenditure on different food categories

URBAN ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	-198.828 ^a	0.288	-12.402	0.803	-131.366 ^b	0.371
Lunch/ breakfast:	9.016	4.274	-7.996	2.550	-48.106 ^d	0.531
Snacks:						
SN1					-68.789 ^c	0.429
SN2					-28.096	0.877

¹Besides the variable URBAN, LOGVINC, AGE, UNITC, EDUTIME, APPL, TSS1, OWNREN are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

Table 25. Ownership of home (OWNREN) and unit expenditure on different food categories

OWNREN ¹ (N:1246)	non-convenient		semi-convenient		convenient	
	B	RSD	B	RSD	B	RSD
Meals:	-196.102	0.907	5.990	5.154	-161.145	0.937
Lunch/ breakfast:	-42.461	2.809	-50.149	1.259	-182.452 ^c	0.433
Snacks:						
SN1					-92.513	0.988
SN2					-83.756	0.911

¹Besides the variable OWNREN, LOGVINC, AGE, UNITC, EDUTIME, APPL, TSS1, URBAN are included in the regression models.

abcd Significant at 0.001, 0.01, 0.05 and 0.10-levels

Finally, it was found that home ownership reduces expenditure on preparation meals, which can be explained by an enlargement of household production due to, among other things, the opportunity to grow vegetables in the garden. This and lower prices for preparation food in such areas may explain the substitution of convenient foods, where the coefficient is also found to be negative, and, for the category lunch-/breakfast, significant. On an aggregate level, these 1987-findings correspond to those of 1981, where home-ownership was found to be an important socio-economic variable classifying different life-style groups (Bonke, 1988).

The conclusion to be drawn here is that the proxies of productivity all seem to influence the choice of foodstuffs in some way. Experience and human capital variables (AGE and EDU-TIME) perform inversely. Age increases spending on non-convenient food-stuffs, and higher educational levels yield lower expenditure. The substitutes seem to be increased spending on semi-convenient food with increased educational level, and less spending on convenient food the older people get.

Possession of household appliances results in more spending on main meal foodstuffs, while the type of technology determines the composition of this kind of expenditure. As anticipated, microwave ovens increase expenditure on semi-prepared foodstuffs and fast food, while dishwashers in principle increase expenditure on preparation foodstuffs. Freezers decrease spending on nearly all categories of foods, although the influence is strongest on fast food and meals out.

Domestic servants do not prepare food in the households, the findings seem to indicate. Thus significantly higher expenditure is found on fast food and meals out, and significantly lower expenditure on semi-convenient and non-convenient food in households with hired help, relative to do-it-alone households.

Some economies of scale or discount effects in household behaviour were found in how the number of family members (UNITC) decreases the overall unit expenditure on main meal foodstuffs. The discount effect is recovered in rural areas and by home owners (URBAN and OWNREN), where less is spent on foodstuffs, and especially on convenient food, in comparison to urban households and tenants.

6. Food regimes

The data analysed showed many households without expenditure on fast food, quick lunch/-breakfast, and particularly without expenditure on meals away from home. One of the reasons is how expenditure in family budget surveys are reported (Eurostat, 1989, 1991). During the rather short registration period (two weeks in the Danish survey), households may not purchase meals away from home, thus not being registered as eating outers, in spite of the fact that before and after the registration period they did spend money on this kind of meals. The same can be said about expenditure on fast food and quick lunch/breakfast, which are registered in a similar way. Since it is considered important to distinguish between different food-regimes (not the same as in part I), the most simple and practical way of doing this is by separating eating-outers from non-eating outers, and likewise for the other groups, by their registered expenditure on these food categories, and subsequently analyse the behaviour of the households in these different food-categories.

Like in Lee and Brown (1986) and Bonke (1991) a probit-procedure is operated, where the first step is to estimate the probability of eating out, the probability of buying fast food, and that of buying fast lunch/breakfast, i.e., being an eating outer, fast fooder and quick luncher. This yields a correction term, λ , which is subsequently used as an independent variable in the regressions of expenditure on meals out, fast food, and quick lunch, as well as in the regressions of the other food-categories. The reason is that the classified groups may be distributed differently on the relevant variables, which is why there is a sample selection bias, which requires correction.

Expenditure is split up into away-from-home expenditure (AFH) and home-food expenditure (HF) with the vectors X_1 and X_2 as explanatory variables, and a Z-vector of variables explaining the decision to eat out (EATOUT*). The sets of explanatory variables are generally assumed to be different between most of these equations, which constitute the model

$$(1) \text{ AFH} = \beta_1' X_1 + u_1$$

$$(2) \text{ AH} = \beta_2' X_2 + u_2$$

$$\text{if EATOUT}^* = \gamma' Z - \varepsilon \geq 0,$$

and otherwise

$$(3) \text{ AFH} = 0$$

$$(4) \text{ AH} = \beta_3' X_2 + u_3,$$

where γ' , β_1' , β_2' and β_3' are parameter vectors, and ε , u_1 , u_2 and u_3 are error terms.

However, EATOUT* is an unobserved variable. It is approximated by the dummy variable EATOUT, i.e., EATOUT=1 if EATOUT* \geq 0 and EATOUT=0 otherwise.

If the residuals u_1, u_2, u_3 and ε have multivariate normal distributions, with mean vector 0 and a specified covariance matrix a two-stage estimation method, i.e., a switching simultaneous equation model (Lee et al., 1980), can be used to estimate equations (1), (2) and (4).

The dependent variables eating out (EATOUT), fast fooders (FASTFOOD) and quick lunchers (QUICKLUB) are all dummies with two scores, which is why the simple linear model $\pi = \alpha + \gamma Z$ is not appropriate for estimating the probability of eating out, buying fast food and quick lunch, respectively. The problem is that the probability of a “1” response is a linear function of Z , which implies probabilities below 0 or above 1 for sufficiently small or large Z -values, whereas probabilities fall between 0 and 1. Therefore a transformation is made to a curvilinear relationship, where the predicted probability of a “1” response falls between 0 and 1 for all possible Z -values, and a fixed change in Z has a smaller impact on π near 0 or near 1, than when π is near the middle of its range. This logistic transformation exercised is described by the function $\log(\pi/(1-\pi)) = \alpha + \gamma Z$, where an increase from 0 to 1 of π equals logit increases from $-\infty$ to ∞ (Agresti & Finlay, 1986).

The ratio of $\pi/(1-\pi)$ that appears in the logit transformation is referred to as the odds, which means that the value of π expresses how many times a response of “1” is likely to be found for one response of “0”. The interpretation of the logistic regression coefficient γ is as an effect on the odds, and taking the antilog of both sides of the logistic equation $\log[\pi/(1-\pi)] = \alpha + \gamma Z$, we have $\pi/(1-\pi) = e^{\alpha+\gamma Z} = e^{\alpha}(e^{\gamma})^Z$. This implies that every unit increase in Z produces a multiplicity effect of e^{γ} on the odds.

In the probit-regressions here the estimated γ -values and the marginal effects are displayed, calculated as

$$(5) \quad \delta/\delta Z_j \text{prob}(\text{eatout}=1|Z) = \gamma_j(e^{\gamma Z}/1+e^{\gamma Z}),$$

which may be interpreted as the partial effect of a unit change in the independent variable on the probability of the dependent variable. The marginal effects of the variables LOGVINC and LOGTIME may be written as $(\delta \text{probit}/\delta(\text{VARCON})) * \text{VARCON}$ and $(\delta \text{probit}/\delta(\text{DISPTIME})) * \text{DISPTIME}$, where probit is the probability of eating out.

The estimation of γ -values by probit maximum likelihood procedures is followed by ordinary least squares (OLS) estimations of (1), (2) and (4), with the addition of a λ -variable defined as $\hat{\phi}/\hat{\Phi}$ in equation (1) and (2), and $\hat{\phi}/(1-\hat{\Phi})$ in (4), where $\hat{\phi}_i = \phi(\hat{\gamma}' Z_i)$ is the standard normal density function and $\hat{\Phi}_i = \Phi(\hat{\gamma}' Z_i)$ is the cumulative normal distribution function. $\hat{\phi}$ and $\hat{\Phi}$ are evaluated at $\hat{\gamma} Z_i$. This means that equation (1) may be reformulated as

$$(6) \quad \text{AFH}_i = \beta_i' X_i - \sigma_{1\varepsilon} \hat{\phi}/\hat{\Phi} + \eta_{1i}$$

and equation (2) as

$$(7) \quad \text{AH}_i = \beta_3' X_i + \sigma_{3\varepsilon} \hat{\phi}_i(1-\hat{\Phi}_i) + \eta_{3i}$$

and estimated by OLS, where η_{1j} and η_{3j} are new error terms with zero conditional means, see Lee and Brown (1986) and Lee et al. (1980).

The reason for splitting up the data into three sets of regimes - eating outers/non-eating outers, fast fooders/non-fast fooders and quick lunchers/non-quick lunchers - and for estimating the probability of eating out, fast food and quick lunch/breakfast separately, is the relatively small correlations between these expenditures, see table 26, where the only significant and positive relationship is found between eating out and fast lunch/breakfast. The average number of eating outers is 56%, fast fooders 59%, and quick lunchers 39%, i.e., the percentage of households with positive expenditure on these different kinds of foodstuffs.

Eating outers

Table 26. Correlation between eating out, fast food and quick lunch/breakfast

	EATOUT	FASTFOOD	QUICKLB
EATOUT	1.00		
FASTFOOD	0.02	1.00	
QUICKLB	0.19 ^a	0.03	1.00

^{abcd}Pearson correlation coefficients, sign. at 0.001, 0.01, 0.05 and 0.10-levels

In table 27, the coefficients of the probability of eating out and the calculated marginal effects are shown for different models. Surprisingly, increasing unit income (LOGVINC) gives rise to fewer eating outers, i.e., an income increase of DKK1000 decreases the probability of eating out by 0.6-0.7% (marginal effect divided by average income on 64.697). And even more surprisingly, eating outers' expenditure (regime I) declines with increasing income (table 29), which means that higher income families eat out more rarely, and, when they do, spend less money than lower-income eating outers. The explanation may be either a lower frequency and less expensive meals by rich people, a much lower frequency and more expensive meals, i.e., luxury behaviour, or a higher frequency and much less expensive meals. However, the figures do not offer a solution.

Table 27 also shows that more disposable time (LOGTIME, i.e., 24 hours (48 hours in couples) minus time for personal care, working hours including transportation and child care) increases the probability of eating out by 0.9% of every marginal hour available per day (marginal effect divided by average DISPTIME on 825 minutes).

The variables determining disposable time (see Part I) differ in their significance for the probability of eating out, and even opposite signs of the regression coefficients are found.

Firstly, the number of working hours on the labour market and especially women's part-time jobs (PARTTIME) increase the probability of eating out. From 0.385 in families where the wife does not participate on the labour market, the probability rises to 0.489 in families with

part-time working wives, whereas double-career families with two full-time jobs (FULLTIME) have an eating out probability rate of 0.434. However, only the effect of part-time participation is significant on a 10%-level (table 27).

Secondly, the life-cycle stage explains the amount of disposable time and consequently the probability of eating out. From 0.437 for singles without children, the estimated overall probability rate increases to 0.455 for couples, being nearly the same for families with pre-school children, 0.452. Finally the probability rate decreases significantly to 0.361 in families with school children. However, the life-cycle effect is even more marked, because pre-school children often have part-time working mothers, causing the probability of eating out to be estimated to a value as high as 0.507.

Not only the probability of eating out decreases significantly with school children (table 27), also expenditure on this type of meal is lower. There is a difference of nearly DKK 500 in the spending on meals out between families with school children and families without school children (table 29). Also the number of children has a negative and significant effect in this respect.

The productivity variables in model C (table 27) are expected to influence the type and quantity of food preparation, and thereby indirectly the frequency of eating out.

Concerning the housekeeper's age (the wife in couples), a proxy of experience in household production, a negative relationship between expenditure on convenient food (fast food and eating out) and this variable was found earlier (table 17). However, a positive and significant correlation between the probability of eating out and the housekeeper's age was found here (table 27), and, among eating outers (regime I in table 30), the coefficient indicates increasing expenditure on meals away from home with increasing age of the housekeeper. The probability of buying fast food does not depend on the age of the housekeeper, as the correlation between age and the probability of being a fast fooder is nearly zero, as illustrated in table 31. Furthermore, expenditure on this foodstuff category is uncorrelated with the age of the fast fooders. However, expenditure on meals away from home decreases with the age of fast fooders, as well as with the age of non-fast fooders (table 34). The explanation may be that eating out and fast fooder regimes represent different populations.

The discrepancy between these findings and the ones presented earlier may be due to the fact that regression on zero-values was made in the OLS-regressions, which is avoided here by using the probit-estimation procedure.

The productivity variables technology (APPL) and domestic servants (DOMSERV) both reduce the probability of eating out, and the expenditure for this kind of meals. In this way, households can be said to behave rationally in exploiting their potential capacities, the figures in tables 27 and 30 show.

Contrary to what could be expected, families in rural areas eat out more frequently than urban households. An eating outers' expenditure for this type of meal indeed increases with ruralization.

Table 27. The decision to eat away from home (EATOUT)- probit estimations¹ (N:1247)

	Γ	Marginal effect	Γ	Marginal effect	Γ	Marginal effect
	Model A		Model B		Model C	
CONSTANT	9.954 ^a (0.214)		11.949 ^a (0.139)		7.884 ^a (0.227)	
LOGVINC	-1.107 ^a (0.134)	-0.476 (0.124)	-1.127 ^a (0.134)	-0.478	-0.916 ^a (0.170)	-0.382
LOGTIME	0.289 (0.668)		..	..	..	..
AGE	..	..	..	..	0.031 ^a (0.167)	0.013
UNITC	..	..	..	..	0.162 (0.952)	(0.068)
COUPLES	..	..	0.072 (3.009)	(0.031)	..	..
CHILD	..	..	0.080 (1.441)	(0.034)	..	..
CHILDP	..	..	-0.067 (3.797)	(-0.028)	..	..
CHILDISC	..	..	-0.445 ^d (0.540)	-0.189	..	..
PARTTIME	..	..	0.422 ^d (0.523)	0.179	..	..
FULLTIME	..	..	0.205 (0.958)	(0.086)	..	..
EDUTIME	..	..	-0.010 (4.836)	(-0.004)	-0.021 (2.411)	(-0.009)
APPL	..	..	..	..	-0.175 (0.781)	(-0.073)
DOMSERV	..	..	..	..	-0.362 (0.698)	(-0.151)
URBAN	..	..	..	..	0.166 ^b (0.318)	0.069
OWNREN	..	..	..	..	0.129 (1.264)	(0.054)
-2 LOG L	1640.729 ^a		1628.735 ^a		1587.076 ^a	
Concordant pairs	61.9%		63.5%		66.3%	

¹ Asymptotic relative standard deviation in parenthesis. Marginal effects are calculated as $\delta/\delta x Z_j \text{prob}(\text{eatout}=1|Z)=\gamma_j(e^{\gamma Z}/1+e^{\gamma Z})$, and numbers in parenthesis indicate insignificant coefficients.

Table 28. Expenditure distribution on different food categories in eating out and in non-eating out households (EATOUT) - means and relative standard deviations

(unit-exp.)	Regime I (N:707)		Regime II (N:538)	
	mean	RSD	mean	RSD
	DKK		DKK	
Food at home				
- preparation meals	2924	0.791	3163	0.801
- semi-prep.meals	374	1.268	358	1.164
- fast meals	364	1.867	405	3.607
Food away from home	1581	1.428	.	.

Table 29. Unit expenditure on different food categories for eating outers and non-eating outers (EATOUT) - two stage estimations¹

Meals:	Regime I (N:707)				Regime II (N:538)		
	At home			Away from home	At home		
	Prep.	Semi-prep	Fast		Prep.	Semi-prep	Fast
Independent variables ² :							
CONSTANT	-53366. b	-3266.099	-78.276	27126.	-50690. d	-1455.511	16233.214 ^d
	(0.352)	(0.991)	(72.992)	(0.649)	(0.563)	(3.360)	(0.593)
LOGVINC	5985.511 ^b	358.954	38.760	-3122.004	4581.893 ^c	168.825	-1210.076
	(0.353)	(1.014)	(16.545)	(0.633)	(0.498)	(2.318)	(0.637)
COUPLES	-784.745	54.719	-140.512	731.859	-86.930	-60.709	72.154
	(0.729)	(1.798)	(1.236)	(0.731)	(7.131)	(1.749)	(2.898)
CHILD	-123.745	-11.032	-87.422 ^d	-299.097 ^d	-227.527	-50.542	-1.946
	(1.406)	(2.700)	(0.601)	(0.541)	(0.861)	(0.664)	(33.975)
CHILDP	221.099	18.401	131.386	-270.126	56.724	154.289 ^c	-145.992
	(1.742)	(3.601)	(0.889)	(1.334)	(7.828)	(0.493)	(1.026)
CHILDS	238.467	105.445 ^d	82.653	-472.252	6.048	69.584	-169.373
	(1.529)	(0.594)	(1.339)	(0.722)	(68.715)	(1.023)	(0.827)
PARTTIME	551.276	-9.871	-30.601	-311.079	-282.894	40.947	-144.891
	(0.664)	(6.384)	(3.633)	(1.101)	(1.397)	(1.653)	(0.920)
FULLTIME	473.781	-13.652	25.556	-396.113	-42.856	60.279	-147.797
	(0.722)	(4.313)	(4.065)	(0.808)	(8.742)	(1.064)	(0.855)
λ	-1012.201 ^c	-38.426	14.986	956.908 ^c	608.723	-13.875	-344.209 ^d
	(0.445)	(2.019)	(9.138)	(0.441)	(0.872)	(6.555)	(0.520)
Adj.R ²	0.0486	0.0375	0.0089	0.1189	0.1070	0.0697	0.0442

¹The probit estimation determining the λ -coefficient is estimated by model A, see table 27.

²The variables also include EDUTIME.

()relative standard deviations.

Finally the covariance between the decision to eat out and expenditure on meals out was found significant, which indicates the presence of selectivity bias. Including the correction term, λ , in the expenditure equations was therefore of importance.

By comparing regimes I and II, it can be seen that higher income in both regimes increases buying of preparation foodstuffs significantly, and that the non-eating outers (regime II) simultaneously decrease expenditure on fast meals, while eating outers (regime I) decrease expenditure on eating out. In this way, more purchasing power seems to imply that both regimes become more home-oriented, probably solving the time-pressure problem by investments in household technology, cf. the positive correlations between APPL, DOMSERV and DISPINC in Part I (Bonke, 1992a, p. 44).

In regime I, preparation meals are substituted for meals away from home, when singles become couples. It also appears that more children decrease expenditure on most of the categories of home foodstuffs in both regimes. The explanation may be that of economies of scale in household production. However, some of the cost reductions are counterbalanced by more semi-preparation meals in regime II, when having pre-school children, and in regime I, when there are school children in the household. In this way, semi-preparation food as well as economies of scale function as time-saving strategies.

The housekeeper's age affects eating outers' expenditure on fast food positively, and while increasing levels of education have a negative effect. Non-eating outers buy more semi-preparation foods, the higher their educational level. This leads to the conclusion that people of higher education do not favour fast meals. Either the household chooses to eat out or it buys semi-preparation meals, whichever is the most appropriate.

For eating outers, household appliances mean increased expenditure on preparation foodstuffs; the same goes for domestic servants. In both cases fast meals seem to be substituted (table 29).

There is no obvious explanation of the negative relationship between domestic servants and expenditures on preparation meals of non-eating outers in table 30.

As the probability of eating out increases the further out in the country people live (see above), expenditure on fast food also increases, while preparation food decreases. The same findings appear for home owners compared to tenants, where the first group behaves like rural households, and the latter more like urban households. The explanation may be that they buy more food informally or grow foodstuffs in their own gardens.

In all the regressions mentioned here, the variance explained is rather low, R^2 of 0.13 at the highest, which has to be taken into account in the interpretations given here.

Table 30. Unit expenditure on different food categories for eating outers and non-eating outers - two stage estimations¹ - productivity variables

Meals:	Regime I (N:707)				Regime II (N:538)		
	At home			Away from home	At home		
	Prep.	Semi-prep	Fast		Prep.	Semi-prep	Fast
Independent variables ² :							
CONSTANT	32191. c	-4163. d	9294.769 ^c	9553.283	1501.344	80.726	3162.123
	(0.424)	(0.573)	(0.452)	(1.361)	(11.742)	(37.768)	(1.904)
LOGVINC	4299.338 ^c	535.954	-1388.293 ^c	-1889.230	190.992	31.239	-210.399
	(0.472)	(0.661)	(0.449)	(1.023)	(8.349)	(8.830)	(2.589)
AGE	-68.491	-10.303	50.918 ^c	102.602	76.410	5.776	13.922
	(1.006)	(1.168)	(0.416)	(0.639)	(0.725)	(1.659)	(1.359)
EDUTIME	48.088	4.215	-32.590	-70.664	-122.608	29.361 ^d	-5.137
	(1.783)	(3.554)	(0.809)	(1.155)	(0.725)	(0.524)	(5.917)
APPL	443.579	18.031	-281.557 ^c	-700.585 ^d	57.560	41.794	38.834
	(0.972)	(4.178)	(0.471)	(0.585)	(6.726)	(1.602)	(3.405)
DOMSERV	1115.504	68.222	-695.698 ^c	-877.568	-1633.904 ^c	-144.733	-241.856
	(0.800)	(2.288)	(0.395)	(0.969)	(0.440)	(0.861)	(1.017)
URBAN	-802.503 ^c	-61.892	247.867 ^c	511.179	137.547	3.319	66.429
	(0.467)	(1.059)	(0.465)	(0.698)	(2.143)	(15.363)	(1.515)
OWNREN	-332.037	-51.551	259.163 ^c	315.701	-325.795	57.860	-144.126
	(1.112)	(1.252)	(0.438)	(1.114)	(1.122)	(1.093)	(0.866)
λ	-800.355	-89.576	394.472 ^c	832.224 ^d	-485.252	-51.734	-123.087
	(0.662)	(1.034)	(0.413)	(0.606)	(0.899)	(1.460)	(1.212)
Adj.R ²	0.0797	0.0392	0.0150	0.1174	0.1326	0.0787	0.0483

¹The probit estimation determining the λ -coefficient is estimated by model C, see table 27.

²The variables also include COUPLES, CHILD, CHILDP, CHILDSC.

(relative standard deviations).

Fast fooders

The most obvious time-saving strategy from the consumer's point of view is buying fast food. Therefore it could be expected that busy and money-rich families are fast fooders more often than idle and money-poor families, and in general spend more money on that food category. This was confirmed in Part I, and here a closer analysis is made.

First of all, it was found that expenditure on fast food, i.e., being a fast fooder, is very common. Nearly 59% of all households spent a positive amount of money on fast food during the registered fortnight, though only DKK 643 on average or 12% of their total food expenditure (table 32).

The estimated probability of buying fast food is 0.387 in model A, 0.389 in model B, and 0.390 in model C (table 31), and primarily LOGVINC, LOGTIME, UNITC, URBAN and OWNREN explain the variations of these probabilities. With every DKK 1000-increase in disposable unit income, the probability decreases marginally by 0.3, which is opposite to expectations. However, whether this is counterbalanced by increasing expenditure on fast food, when being a fast fooder, is uncertain, because positive as well as negative regression coefficients were found between LOGVINC and fast food in the models in tables 33 and 34, which indicates collinearity of the regressors.

The marginal effect of more disposable time is a decreased probability of buying fast food, i.e., every hour of extra free time means 0.9% fewer fast fooders, which indicates rational time allocation on behalf of the consumers. The explanatory variables of disposable time (see table 10 in Part I) are all highly insignificant in explaining the likelihood of having fast food, see model B (table 31). However, the UNITC-variable has the same marginal effect on the probability as disposable time, indicating economies of scale, or less satisfaction achieved by this food category, the bigger the families are.

The educational level seems to increase the probability of buying fast food slightly. The home owner effect is significant; it increases the likelihood of being a fast fooder by 13% compared to the situation of tenants. And, being a fast fooder, expenditure increases by home-ownership, and so does expenditure on eating meals away from home (table 34).

The effect of urbanisation is negative in the sense that rural people have a higher probability of buying fast food than urban people, and eating that kind of food increases with ruralization, which is also the case for expenditure on meals out, see above. These findings are opposite to expectations, unless the phenomenon is caused by lower prices and alternative distribution channels on preparation foodstuffs in rural areas, which gives room for more expenditure on convenient food in the household budgets.

When spending money on fast food, higher education entails higher expenditure on meals out and less on preparation meals. More household appliances as well as two full-time jobs mean less expenditure on meals out and more on preparation meals (tables 34 and 33). A double-career family, highly educated, with modern time-saving technology, sometimes eating fast food, therefore has an ordinary food choice behaviour, because the underlying effects outweigh each other, one could argue.

Like the other regressions in this report, the models presented here explain only a fraction of the variance of expenditure on different food-categories. However, the models of the meals-away-from-home foodstuffs in general fit the best, having the highest adj.R².

Table 31. The decision to eat fast food (FASTFOOD) - probit estimations¹ (N:1247)

	Γ	Marginal effect	Γ	Marginal effect	Γ	Marginal effect
	Model A		Model B		Model C	
CONSTANT	6.781 ^b (0.304)		4.413 ^b (0.349)		4.551 ^b (0.372)	
LOGVINC	-0.469 ^a (0.297)	-0.181	-0.448 ^b (0.312)	-0.174	-0.449 ^b (0.323)	-0.174
LOGTIME	-0.313 ^d (0.601)	-0.121	..	..	..	..
AGE	..	..	..	..	-0.002 (2.367)	(-0.001)
UNITC	..	..	..	..	-0.311 ^c (0.484)	-0.121
COUPLES	..	..	-0.022 (9.402)	(-0.008)	..	..
CHILD	..	..	-0.008 (14.448)	(-0.003)	..	..
CHILDP	..	..	0.056 (4.503)	(0.022)	..	..
CHILDS	..	..	-0.174 (1.370)	(-0.067)	..	..
PARTTIME	..	..	0.010 (21.653)	(0.004)	..	..
FULLTIME	..	..	-0.116 (1.664)	(-0.045)	..	..
EDUTIME	..	..	0.062 (0.780)	(0.024)	0.066 (0.744)	(0.025)
APPL	..	..	..	..	-0.081 (1.660)	(-0.031)
DOMSERV	..	..	..	..	0.250 (0.944)	(0.097)
URBAN	..	..	..	..	0.089 ^d (0.580)	0.035
OWNREN	..	..	..	..	0.340 ^c (0.477)	0.132
-2 LOG L	1651.439 ^b		1648.778 ^c		1639.971 ^b	
Concordant pairs	55.4%		55.7%		56.7%	

¹ Asymptotic relative standard deviation in parenthesis. Marginal effects are calculated as $\delta/\delta x_j \text{prob}(\text{eatout}=1|Z)=\gamma_j(e^{\gamma Z}/1+e^{\gamma Z})$, and numbers in parenthesis indicate insignificant coefficients.

Table 32. Expenditure distribution on different food categories in fast food and non-fast food households (FASTFOOD) - means and relative standard deviations

(unit-exp.)	Regime I (N:763)		Regime II (N:482)	
	mean	RSD	mean	RSD
	DKK		DKK	
Food at home				
- preparation meals	3389	0.737	2500	0.873
- semi-prep.meals	414	1.174	299	1.278
- fast meals	643	2.112	.	.
Food away from home	906	2.070	865	2.138

Table 33. Unit expenditure on different food categories for fast fooders and non-fast fooders (FASTFOOD) - two stage estimations¹

Meals:	Regime I (N:763)			Regime II (N:482)			
	At home		Away	At home		Away	
	Prep.	Semi-prep	from home	Fast	Prep.	Semi-prep from home	
Independent variables ² :							
CONSTANT	7995.848 (0.941)	-941.892 (1.359)	-21488. ^a (0.259)	-9369.944 ^a (0.287)	16848. (1.179)	-681.318 (5.193)	-17952. (0.953)
LOGVINC	-1890.891 (0.610)	25.397 (7.733)	2655.049 ^b (0.322)	1463.285 ^a (0.282)	658.463 (2.011)	97.526 (2.418)	1527.514 (0.746)
COUPLES	-1572.879 ^c (0.442)	-55.777 (2.121)	670.284 (0.769)	335.256 (0.741)	-626.221 (1.397)	-54.933 (2.837)	-104.045 (7.242)
CHILD	-305.364 ^d (0.557)	-72.870 ^c (0.397)	-212.073 ^d (0.595)	-67.936 (0.896)	-46.188 (4.247)	37.142 (0.940)	-73.806 (2.288)
CHILDP	422.640 (0.902)	169.251 ^b (0.383)	-89.334 (3.166)	20.228 (6.740)	15.021 (28.634)	-28.374 (2.699)	-565.755 (0.654)
CHILDS	190.866 (1.849)	157.768 ^b (0.380)	-92.837 (2.820)	-26.397 (4.780)	-135.400 (3.095)	-22.493 (3.318)	-514.003 (0.702)
PARTTIME	883.569 ^c (0.417)	52.792 (1.188)	-526.774 ^d (0.519)	-259.764 ^c (0.507)	-307.742 (1.408)	1.975 (39.087)	-27.336 (13.655)
FULLTIME	813.805 ^c (0.450)	34.913 (1.788)	-564.579 ^c (0.482)	-273.084 ^c (0.480)	34.791 (12.607)	52.185 (1.496)	110.479 (3.418)
λ	1713.094 ^b (0.330)	103.829 (0.928)	-672.081 (0.624)	-611.963 ^b (0.331)	-1085.182 (0.727)	-21.137 (6.650)	390.173 (1.742)
Adj.R ²	0.0730	0.0546	0.0966	0.0644	0.0532	0.0218	0.0841

¹The probit estimation determining the λ -coefficient is estimated by model A, see table 31.

²The variables also include EDUTIME.

(.)relative standard deviations.

Table 34. Unit expenditure on different food categories for fast fooders and non-fast fooders (FASTFOOD) - two stage estimations¹ - productivity variables

Meals:	Regime I (N:763)			Regime II (N:482)			
	At home		Away from home	At home		Semi-prep	Away from home
	Prep.	Semi-prep		Fast	Prep.		
Independent variables ² :							
CONSTANT	-49955.	-2269.456	35348.	6383.266	31055.	1624.833	-10972
	(0.612)	(2.301)	(0.635)	(1.730)	(1.122)	(3.953)	(2.820)
LOGVINC	8210.023	220.450	-7406.220 ^d	-1264.571	-1758.167	-63.989	1111.260
	(0.701)	(4.460)	(0.570)	(1.644)	(1.390)	(7.041)	(1.953)
AGE	59.030 ^c	0.441	-60.985 ^b	-8.253	24.317 ^d	-0.344	-15.767
	(0.493)	(11.274)	(0.350)	(1.273)	(0.575)	(7.494)	(0.787)
EDUTIME	-1126.546	13.686	1264.854 ^c	232.662	538.247	48.768	-29.015
	(0.756)	(10.625)	(0.494)	(1.321)	(0.687)	(1.398)	(11.323)
APPL	1477.464	-14.620	-1483.839 ^d	-222.943	-753.700	1.923	-2.513
	(0.717)	(12.370)	(0.523)	(1.715)	(0.673)	(48.650)	(179.329)
DOMSERV	-4108.612	-102.214	5534.336 ^c	723.480	975.034	67.639	-140.178
	(0.783)	(5.373)	(0.426)	(1.605)	(1.464)	(3.890)	(9.042)
URBAN	-1398.694	1.154	1572.248 ^d	290.465	261.179	20.585	-114.839
	(0.825)	(170.887)	(0.539)	(1.435)	(1.835)	(4.293)	(3.707)
OWNREN	-5373.390	26.296	6409.614 ^c	1123.747	2336.904	188.658	-305.178
	(0.818)	(28.561)	(0.503)	(1.413)	(0.776)	(1.773)	(5.281)
λ	-3431.680	13.213	4408.270 ^c	775.732	-1852.207	-121.089	191.098
	(0.868)	(38.509)	(0.496)	(1.386)	(0.796)	(2.245)	(6.852)
Adj.R ²	0.0776	0.0537	0.1209	0.0512	0.1149	0.0201	0.0894

¹The probit estimation determining the λ -coefficient is estimated by model A, see table 31.

²The variables also include COUPLES, CHILD, CILDPR, CHILDSC.

(relative standard deviations).

Quick lunchers

Table 26 above showed that expenditures on fast lunch/breakfast are positively correlated with expenditure on eating meals away from home. However, only a segment of the households in the family budget survey sample registered positive expenditure on these food categories, i.e., so-called quick lunchers and eating outers, and table 35 shows that being a quick luncher decreases the probability of eating out by 30%, while the probability of eating fast food is not affected significantly.

The substitution between buying fast lunch/breakfast and meals out may capture great diversities, which is confirmed by the large relative standard deviations in expenditure on the two food categories, which is found for eating outers and quick lunchers, respectively, in tables 28

and 37. Unskilled workers may have lunch in canteens but no main meals at restaurants, and upper class people have no expenditure on fast lunch, because the meal is free, making them non-quick lunchers in our terminology, and at the same time usually taking their main meal at restaurants.

It is found that the probability of buying fast lunch/breakfast is reduced by 1.0% for every DKK 1000-increase in income (marginal effect divided by average income 64.697), cf. table 36, where the coefficient of LOGVINC and this food-category is negative and highly significant.

Table 35. The decision to eat out and to buy fast food, being a quick luncher - probit estimations (N:1247)

	EATOUT		FASTFOOD	
	Γ	Marginal effect	Γ	Marginal effect
Independent variables ¹ :				
QULBDU	-0.704 ^a (0.180)	-0.299	-0.064 (1.936)	(-0.025)
-2 LOG L	1597.381 ^a		1648.511 ^d	
Concordant pairs	66.2%		55.8%	

¹ The probit-estimation also includes the variables in model B, see table 36.

If households eat main meals away from home as well as quick lunch, they substitute preparation food by these foodstuffs, as the appendix shows (table A7). This could be called away-from-home oriented households, as regards food patterns. And it is even more pronounced (appendix table A8) that households who buy fast food as well as quick lunch substitute eating out by preparation foodstuffs, i.e., the coefficients of expenditure on the two groups of foodstuffs and the dummy-variable QULBDU for the fast food regime I are positive and negative, respectively, which implies that these households are **really** away-from-home oriented with respect to food behaviour. For the non-fast food regime II no such substitution occur, i.e., being a quick luncher means only a decrease in expenditure on preparations foodstuffs.

The older the housekeeper (the wife in couples), the more likely purchases of quick lunch/-breakfast are (table 36). Whether the rate of increase diminishes is not known, and would require further analysis of the data.

More interesting is the relationship between the number of individuals and the composition of the household and the buying of fast lunch/breakfast. First, negative coefficients are found for the variables UNITC, CHILD, CHILDP and CHILDS, though the latter are insignificant, and a positive and significant coefficient is found for the variable COUPLES. This means that marriage decreases the likelihood of bringing packed lunches to work, while having children increases this probability - making an extra packed lunch does not take long, because of economy of scale in the production.

Table 36. Decision to eat fast lunch/breakfast (QUICKLB) - probit estimations¹ (N:1247)

	Γ	Marginal effect	Γ	Marginal effect	Γ	Marginal effect
	Model A		Model B		Model C	
CONSTANT	11.140 ^a (0.195)		12.440 ^a (0.136)		9.767 ^a (0.192)	
LOGVINC	-1.118 ^a (0.136)	-0.684 (0.147)	-1.094 ^a (0.140)	-0.673	-1.011 ^a (0.162)	-0.622
LOGTIME	0.240 (0.800)		..	..	..	..
AGE	..	..	..	..	0.035 ^a (0.161)	0.022
UNITC	..	..	..	..	-0.327 ^c (0.485)	-0.201
COUPLES	..	..	0.510 ^c (0.447)	0.313	..	..
CHILD	..	..	-0.037 (3.052)	(-0.023)	..	..
CHILDPR	..	..	-0.129 (2.003)	(-0.079)	..	..
CHILDSC	..	..	-0.218 (1.108)	(-0.134)	..	..
PARTTIME	..	..	-0.088 (2.682)	(-0.054)	..	..
FULLTIME	..	..	-0.606 ^b (0.347)	-0.373	..	..
EDUTIME	..	..	0.033 (1.543)	(0.020)	0.034 (1.540)	(0.021)
APPL	..	..	..	..	0.007 (19.469)	(0.004)
DOMSERV	..	..	..	..	-0.156 (1.605)	(-0.096)
URBAN	..	..	..	..	0.323 ^a (0.166)	0.199
OWNREN	..	..	..	..	0.278 ^d (0.598)	0.171
-2 LOG L	1609.814 ^a		1591.141 ^a		1516.436 ^a	
Concordant pairs	62.7%		64.0%		69.3%	

¹ Asymptotic relative standard deviation in parenthesis. Marginal effects are calculated as $\delta/\delta x Z_{ij} \text{prob}(\text{eatout}=1|Z)=\gamma_j(e^{\gamma_j Z}/1+e^{\gamma_j Z})$, and numbers in parenthesis indicate insignificant coefficients.

Table 37. Expenditure distribution on different food categories in quick lunch and in non-quick lunch households (QUICKLB) - means and relative standard deviations

(unit-exp.)	Regime I (N:491)		Regime II (N:754)	
	mean	RSD	mean	RSD
	DKK		DKK	
Preparation lunch/ breakfast	2498	0.615	2695	0.604
Semi-prep. lunch/ breakfast	1258	0.648	1224	0.695
Fast lunch/breakfast	1086	1.732	.	.

For quick lunchers (regime I), expenditure on this food-category decreases with the number of children, and as expected it seems that having school children is the strongest condition to that effect. Regime II households, with no expenditure on fast lunch/breakfast, spend more money on semi-preparation lunch/breakfast foodstuffs, including lunch box items (bread, dairy products, etc.), the more children they have. When married, expenditure on these foodstuffs decreases. Full-time working wives increase expenditure on semi-preparation stuffs, however, partly counterbalancing the effect of marriage (part of a couple).

Part-time working women imply more expenditure on preparation lunch/breakfast foodstuffs than full-time or non-participating women in households belonging to the quick lunch regime (II), see table 38. Also, educational level and home-ownership have negative effects, which means that higher educated people and home-owners spend less on preparation lunch/-breakfast foods, than lower educated and tenants.

Finally, mention must be made of the income effect, which for non-quick lunchers means much increased expenditure on semi-preparation foodstuffs, i.e., it could be argued that these households spend more money on luxury boxed lunches or on home eating on weekends.

Table 38. Unit expenditure on different food categories for fast lunch/breakfast eaters and non-fast lunch/breakfast eaters. (QUICKLB) - two stage estimations¹

	Regime I (N: 491)			Regime II (N: 754)	
	At home		Fast	At home	
	Preparation lunch/breakfast	Semi-prep. lunch/breakfast	lunch/breakfast	Preparation lunch/breakfast	Semi-prep. lunch/breakfast
Independent variables ² :					
CONSTANT	-17151. (0.667)	-2189.317 (2.831)	11232. (0.968)	-6530.369 (3.835)	-22194. ^d (0.582)
LOGVINC	2012.864 (0.607)	313.362 (2.112)	-1093.719 (1.061)	867.052 (2.228)	1888.106 ^d (0.527)
COUPLES	166.957 (2.096)	-42.978 (4.412)	-429.032 (0.775)	72.222 (5.604)	-346.131 ^d (0.603)
CHILD	-21.914 (5.813)	93.646 (0.737)	-239.009 ^c (0.506)	146.765 (0.798)	171.098 ^b (0.353)
CHILDP	-55.560 (5.133)	20.227 (7.639)	59.535 (4.553)	-422.496 (0.619)	-26.078 (5.174)
CHILDS	210.706 (1.315)	80.522 (1.865)	-218.196 (1.208)	-211.412 (1.115)	-196.063 (0.620)
PARTTIME	513.980 ^d (0.579)	-117.701 (1.371)	-141.575 (2.001)	-250.545 (0.893)	181.064 (0.637)
FULLTIME	406.945 (0.647)	42.925 (3.323)	69.910 (3.580)	-41.157 (5.477)	208.361 ^d (0.558)
λ	-414.481 (0.715)	-11.429 (14.063)	382.754 (0.736)	-26.331 (15.271)	273.741 (0.757)
R ²	0.0742	0.0403	0.1193	0.0764	0.1217
Adj.R ²	0.0569	0.0224	0.1029	0.0652	0.1111

¹The probit estimation determining the λ -coefficient is estimated by model A, see table 36.

²The variables also includes EDUTIME.

()relative standard deviations.

Table 39. Unit expenditure on different food categories for fast lunch/breakfast eaters and non-fast lunch/breakfast eaters (QUICKLB) - two stage estimations¹- productivity variables

	Regime I (N: 491)			Regime II (N: 754)	
	At home		Fast lunch/ breakfast	At home	
	Preparation lunch/ breakfast	Semi-prep. lunch/ breakfast		Preparation lunch/ breakfast	Semi-prep. lunch/ breakfast
Independent variables ² :					
CONSTANT	11194. ^d	-1783.843	-2736.591	-6679.889	-8832.472
	(0.523)	(1.787)	(2.051)	(2.865)	(1.125)
LOGVINC	1554.057 ^d	241.179	427.666	807.029	917.395
	(0.512)	(1.799)	(1.786)	(2.116)	(0.966)
AGE	-14.473	9.506	-11.364	25.224	-15.967
	(1.984)	(1.645)	(2.422)	(2.409)	(1.976)
EDUTIME	-155.344 ^c	-13.817	-12.674	42.675	2.115
	(0.414)	(2.536)	(4.868)	(1.810)	(18.962)
APPL	2.164	-58.940	-40.577	-56.114	58.296
	(74.234)	(1.484)	(3.794)	(2.317)	(1.157)
DOMSERV	50.538	61.221	40.895	-410.285	79.158
	(6.026)	(2.709)	(7.138)	(0.846)	(2.278)
URBAN	-392.395	-10.609	72.785	87.525	-131.196
	(0.669)	(13.483)	(3.459)	(6.189)	(2.144)
OWNREN	-558.767 ^d	-171.973	-227.507	149.767	-99.178
	(0.527)	(0.932)	(1.241)	(3.321)	(2.604)
λ	-317.070	7.312	11.728	-64.840	84.017
	(0.667)	(15.759)	(17.294)	(6.094)	(2.442)
R ²	0.0973	0.0544	0.1267	0.0872	0.1206
Adj.R ²	0.0747	0.0307	0.1049	0.0724	0.1064

¹The probit estimation determining the λ -coefficient is estimated by model C, see table 36.

²The variables also includes COUPLES, CHILD, CHILDPR, CHILDSC.

()relative standard deviations.

7. Life cycles

Up till now all households have been pooled irrespective of marital status. The justification was that using unit expenditure and unit income made the necessary correction, weighing the different life-stage groups in an appropriate way. However, the consequence was that no information was offered about the discrepancy between the food choice behaviour of single adults and couples.

Table 40 shows that singles have a higher unit expenditure on convenient meals than couples, and that the fast food category as well as the meals out category explain this difference. Non-convenient meals and semi-convenient meals are substituted by convenient meals, and nearly the same pattern can be found with regard to lunch/breakfast, where expenditure on non-convenient is substituted by expenditure on convenient foodstuffs, when the life-stage single is compared to that of couples.

Table 40. Unit expenditures on different food-categories of singles and couples (DKK)

	non-convenient		semi-convenient		convenient	
	single	couples	singles	couples	singles	couples
	(N:290)	(N:957)	(N:290)	(N:957)	(N:290)	(N:957)
Meals:	2869	3142	342	381	1843	1067
	(0.937)	(0.741)	(1.319)	(1.042)	(1.638)	(1.545)
- fast					547	314
food					(2.250)	(1.636)
- meals					1296	752
out					(2.093)	(2.048)
Lunch/ breakfast:	2471	2719	1236	1272	678	325
	(0.801)	(0.533)	(0.856)	(0.602)	(2.013)	(2.917)
Snacks:						
SN1					1352	1537
					(1.008)	(0.785)
SN2					642	638
					(2.621)	(1.031)

()relative standard deviations.

The time-saving strategy to buy more convenient food is not only a question of the average expenditure on this food-category. As mentioned above, many households did not have any expenditure during the fortnight where they kept the logbook, which gives many zero-observations. The percentage of single households spending money on meals away from home (eating outers) is 63, while the corresponding percentage for couples is only 55. The proportion of households spending money on fast food and fast lunch/breakfast did not vary much between single adults and couples, i.e., 60% and 62% are fast fooders and 41% and 39% quick lunchers, respectively.

By including other life-cycle components, results show that eating out is 41% more likely for single adults aged 45 years or more, than for single adults under 45 years (AGEDU). The likelihood of quick lunches is 57% higher for the older group. The probability of eating out and quick lunches for couples also increases by age, viz. 2% per year of the housekeeper (table 41).

Surprisingly, the gender variable in the probit estimations of single adults does not show any significant relationship to the probability of buying the convenient foodstuffs analysed here. The only finding to be mentioned concerns eating outers, among which women spend less money than men on meals away from home, though the difference is not significant. Lindvall (1989), analysing the same problem without doing probit-estimations, finds, however, that Swedish single women spend significantly less on meals out than Swedish single men.

The expenditures on meals out are effected negatively by the number of children in couples belonging to the eating-out regime. Again, the Swedish results confirm that finding, though via a statistically more simple analysis. In table 41 it is demonstrated that the effect of children is entirely limited to school children, who decrease expenditure on eating out.

In single households, school children increase expenditure on eating out, which may be explained by socio-economic conditions in this type of family. In the same way younger children also increase this expenditure. All this refers to eating outers. The probability of belonging to that regime, however, is only affected significantly in couples, where pre-school children increase the likelihood of eating out by 29% (table 41).

In couples, the number of children decreases the probability of being a quick luncher by nearly 14%, i.e., packed lunches may be the substitute (table 43).

Another kind of variable is participation and working hours in the labour market, which is assumed only to vary for married women. A look at that phenomenon reveals that couples with part-time working women increase the probability of being an eating outer by 16% (table 41), while the probability of eating fast lunch/breakfast decreases by 18% (table 43). The interpretation may be that women's earnings are viewed as transitory income (Strober, 1977), filling the gap between the demand on consumption and income during the stage of life-cycle where eating out is perceived as luxury consumption. The decrease in the likelihood of buying quick lunch corresponds with a more home-oriented food behaviour in the non-main meals. However, the same tendency is found for households with full-time working wives with 45% lower probability of eating fast lunch/breakfast than other types of households (table 43). Packed lunches substituting canteen lunches are an appropriate explanation of that behaviour, though other interpretations are reasonable as well.

For eating outers and quick lunchers, expenditure on these foodstuffs increases when the wife works part-time or full-time, respectively. Neither relationship is significant.

Table 41. The decision to eat away from home, and the expenditure on away-from-home-meals - two stage estimations

	Singles			Couples		
	Decision of eating out	Eating outers' expenditures on eating out		Decision of eating out	Eating outers' expenditures on eating out	
	Γ	Marginal effect	B	Γ	Marginal effect	B
Independent variables:	(N:290)		(N:181)	(N:957)		(N:525)
CONSTANT	9.668 ^b (0.380)		71201 (0.691)	7.014 ^a (0.297)		605.692 (12.041)
LOGVINC	-0.956 ^b (0.336)	-0.356	-9362.012 (0.644)	-0.866 ^a (0.212)	-0.389	-257.683 (4.668)
SEX	-0.373 (2.013)	(-0.139)	-4568.116 (0.623)			
AGEDU/AGE	1.095 ^a (0.298)	0.407	13500. ^c (0.506)	0.040 ^a (0.181)	0.018	28.489 (1.917)
CHILD				-0.056 (2.222)	(-0.025)	-345.423 ^c (0.482)
CHILDP	0.919 (0.887)	(0.342)	10634. ^d (0.565)	0.639 ^c (0.485)	0.287	360.385 (2.723)
CHILDS	0.475 (1.539)	(0.176)	4681.799 (0.729)	-0.137 (2.019)	(-0.061)	-590.088 ^d (0.596)
EDUTIME	-0.123 (0.797)	(-0.046)	-1485.275 ^d (0.538)	0.028 (2.190)	(0.012)	36.558 (2.222)
PARTTIME				0.366 (0.645)	(0.164)	481.330 (1.188)
FULLTIME				0.174 (1.214)	(0.078)	253.826 (1.331)
APPL	-0.037 (12.436)	(-0.013)		-0.236 (0.624)	(-0.106)	
APPL1			-917.139 (1.263)			-288.535 (1.109)
APPL2			-863.094 (0.609)			-39.797 (3.976)
APPL3			-951.145 (1.171)			-149.640 (2.245)
DOMSERV	-1.065 (0.744)	(-0.396)	-13364. ^d (0.508)	-0.367 (0.738)	(-0.165)	111.005 (5.349)
URBAN	0.312 ^b (0.379)	0.116	3898.542 ^d (0.506)	0.141 ^c (0.430)	0.063	26.008 (7.830)
HOMEOWN	-0.196 (1.798)	(-0.073)	-2541.871 ^d (0.555)	0.154 (1.245)	(0.069)	115.477 (2.619)
λ			2903.078 ^d (0.508)			268.856 (1.235)
-2 LOG L	348.025 ^a			1214.860 ^a		
Concordant pairs	69.7%			67.8%		
Adj.R ²			0.1245			0.0927

(relative standard deviations.

Table 42. The decision to eat fast food, and the expenditure on fast food - two stage estimations

	Singles			Couples		
	Decision of eating fast food	Marginal effect	Fast fooders' expenditures on fast food	Decision of eating fast food	Marginal effect	Fast fooders' expenditures on fast food
Independent variables:	Γ (N:290)		B (N:172)	Γ (N:957)		B (N:590)
CONSTANT	-2.272 (1.493)		543.626 (18.694)	6.155 ^b (0.326)		-379.966 (19.164)
LOGVINC	0.256 (1.143)	(0.103)	78.691 (8.370)	-0.708 ^a (0.249)	-0.270	-20.594 (58.318)
SEX	-0.399 (1.929)	(-0.161)	422.368 (2.624)			
AGEDU/AGE	-0.444 (0.722)	(-0.179)	817.592 (1.358)	0.006 (1.090)	(0.002)	-3.057 (3.605)
CHILD				-0.081 (1.546)	(-0.031)	-144.180 (1.013)
CHILDP	-0.836 (1.018)	(-0.337)	-120.932 (17.603)	0.435 (0.706)	(0.166)	342.710 (2.196)
CHILDS	-0.098 (7.593)	(-0.039)	-604.613 (1.173)	0.070 (3.935)	(0.026)	76.105 (2.010)
EDUTIME	-0.075 (1.209)	(-0.030)	98.287 (2.005)	0.122 ^c (0.499)	0.046	36.669 (5.616)
PARTTIME				0.100 (2.312)	(0.038)	-33.409 (5.601)
FULLTIME				0.017 (11.982)	(0.006)	-15.248 (4.991)
APPL	-0.516 (0.914)	(-0.208)		-0.030 (4.786)	(-0.011)	
APPL1			-400.358 (2.747)			159.981 ^d (0.563)
APPL2			-189.419 (1.430)			98.833 ^c (0.493)
APPL3			218.173 (5.289)			27.799 (2.456)
DOMSERV	1.049 (0.668)	(0.423)	-1948.388 (1.259)	0.140 (1.855)	(0.053)	17.397 (14.412)
URBAN	-0.052 (2.161)	(-0.021)	74.376 (2.225)	0.109 ^d (0.552)	0.042	24.010 (7.845)
HOMEOWN	0.390 (0.852)	(0.157)	-152.298 (6.467)	0.221 (0.870)	(0.084)	30.460 (12.770)
λ			-136.435 (3.990)			95.016 (4.162)
-2 LOG L	374.206 ^d			1234.760 ^a		
Concordant pairs	65.6%			61.0%		
Adj.R ²			0.0084			0.0600

()relative standard deviations.

Table 43. The decision to eat fast lunch/breakfast, and the expenditure on fast lunch/breakfast - two stage estimations

	Singles			Couples		
	Decision of eating fast lunch/break.	Marginal effect	Quick lunchers' expenditures on fast l/b.	Decision of eating fast lunch/break.	Marginal effect	Quick lunchers' expenditures on fast l/b.
Independent variables:	(N:290)		(N:118)	(N:957)		(N:372)
CONSTANT	7.572 ^c (0.475)		-53.244 (229.182)	9.359 ^a (0.237)		-2402.237 (2.554)
LOGVINC	-0.722 ^c (0.429)	-0.425	-58.606 (26.914)	-0.980 ^a (0.200)	-0.597	390.326 (2.093)
SEX	-0.549 (1.580)	(-0.323)	-1050.706 (1.525)			
AGEDU/AGE	0.969 ^b (0.354)	0.571	2010.539 (0.992)	0.034 ^a (0.224)	0.021	-23.226 (1.251)
CHILD				-0.225 ^d (0.572)	-0.137	-210.528 (1.055)
CHILDP	1.234 (0.751)	(0.727)	891.091 (3.075)	0.295 (1.068)	(0.180)	172.526 (2.262)
CHILDS	0.502 (1.703)	(0.296)	-307.427 (4.909)	-0.070 (4.092)	(-0.043)	121.431 (2.395)
EDUTIME	0.088 (1.054)	(0.052)	84.617 (2.723)	0.020 (3.224)	(0.012)	-21.156 (3.116)
PARTTIME				-0.291 (0.896)	(-0.177)	341.881 (1.106)
FULLTIME				-0.736 ^b (0.315)	-0.449	615.079 (1.080)
APPL	-0.308 (1.465)	(-0.181)		0.074 (2.081)	(0.045)	
APPL1			-802.219 (1.209)			-251.186 (1.247)
APPL2			349.066 (1.018)			-78.205 (1.961)
APPL3			-1620.556 (0.635)			77.838 (2.142)
DOMSERV	-0.469 (1.595)	(-0.276)	-1502.955 (0.899)	-0.149 (1.808)	(-0.091)	113.600 (2.575)
URBAN	0.373 ^b (0.313)	0.220	357.118 (2.210)	0.318 ^a (0.196)	0.194	35.442 (7.740)
OWNREN	0.030 (11.740)	(0.017)	-103.090 (4.791)	0.459 ^c (0.423)	0.280	-448.406 (0.979)
λ			333.404 (1.686)			-36.068 (6.107)
-2 LOG L	361.133 ^a			1135.773 ^a		
Concordant pairs	68.7%			71.3%		
Adj.R ²			0.1207			0.0474

(relative standard deviations.

A higher educational level of singles decreases the probability of eating out, and increases the probability of buying quick lunch. The latter phenomenon may be due to a fairly labour-market oriented life-style including more comfortable lunch arrangements. The education effect on the likelihood of eating out combines with significantly decreasing expenditure on these foods with rising education. Finally, table 42 shows that higher educated couples eat fast food more frequently than lower educated do.

The technology variables show that couples' possession of microwave ovens and/or dishwashers decreases the probability of eating out (table 41). Among other findings, mention only has to be made of the fact that couples eating fast food significantly increase their expenditure on this kind of food when possessing microwave ovens and freezers.

Couples as well as singles eat out less frequently when hiring domestic help, and for singles who do eat out, the expenditure is less.

Urbanisation means less frequent meals-away-from-home and quick lunches for singles and couples, and, when eating out, the effect of urbanisation is less expenditure on these meals.

Finally, the probability of homeowners, singles and couples buying fast food, is bigger than that of tenants, and home-owning couples also have a higher probability of eating quick lunch, though tenants being quick lunchers spend more on that food category than owners. Moreover, single tenants eating the main meal away from home also spend more on that consumption than analogous home-owner households.

All the probit-estimations and regressions applied, however, explain only a minor part of the variance in the data, which has to be taken into account when interpreting the findings. The quality of the data in the family budget survey is the main problem. However, as long as they are the only available data, we are forced to base our empirical research work on these data.

8. Conclusion

In part I (Bonke, 1992a), rationality in the choice of foodstuffs was analysed by constructing different regimes to which households belong, depending on their economic resources, time and money. Some rational behaviour was found in that time-poor and money-rich households to a greater extent buy fast food and spend more money on eating out than time-rich and money-poor households.

Here in part II, the choice of different kinds of food - proxies of food regimes - is analysed by regression models, investigating the effect of the variables in part I with the separate effect of yet a number of variables.

Because of the problems in taking the logarithm of variables with many 0-observations, unit expenditure (adjusted for different household compositions) and percent expenditure (percentage of all food expenditures) were chosen as untransformed dependent variables in the regressions. Since, however, the phenomenon of 0-observations is infrequent for the independent variables *disposable income* and *disposable time*, and in order to obtain more appropriate interpretations, it was decided to perform semi-logarithm regressions.

Disposable income net of dwelling costs was employed, because it offers the best explanation of the variation of different food expenditures.

The main findings of the implication of restricted economic resources, **time** and **money**, on food choice are the following:

- * Unit expenditure and per cent expenditure on convenient foods increase with disposable income, and decrease with disposable time, indicating rational economic behaviour. Likewise, unit and per cent expenditure on non-convenient food increases with disposable time. Per cent expenditure on non-convenient food decreases with disposable income.
- * However, the theory is not verified for the relationship between disposable income and unit expenditure on non-convenient food, where the relationship is positive and not negative, as expected. The explanation may be that expenditure on preparation food increases with income due to purchases of more expensive foodstuffs, but that spending on other goods increases even more, which is why the per cent expenditure on preparation foods decreases.
- * These findings are verified for the expenditure on main meal products, which counts for more than one third of the food expenditure. Expenditure on fast food and meals out increases with disposable income and decrease with disposable time, which is the case for unit expenditure as well as for per cent expenditure, and the unit expenditure on preparation meals increases with disposable time and disposable income.
- * The relationship between disposable time and unit expenditure on fast food plus meals out is of nearly the same size as that of all convenient foodstuffs. In a meal perspective, the opportunity of having more disposable time therefore primarily affects main meal menus.

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- * Comparing Danish and Swedish (Lindvall, 1989) unit expenditure on fast food and meals out and expenditure on preparation meals by estimating income-elasticities on the average income household, lower numbers are found in Sweden than in Denmark. Spendings on the two categories of foodstuffs are affected much more by changing income in Denmark than in Sweden.
 - * The expenditure pattern on lunch and breakfast follows that of the main meal category, with increasing expenditure on fast food, the more disposable income and the less disposable time, as well as increasing expenditure on preparation food with more of both kinds of economic resources. However, the interpretation concerning the fast lunch and breakfast category has to be a careful one, because it only includes a very small part of the total expenditure on foodstuffs.
 - * Unit and per cent expenditure on snacks (SN1) increase with disposable income and disposable time, implying that more money as well as more time spell more snacks. Unit expenditure on fruit (SN2) increases with disposable income, and disposable time does not matter significantly. However, the per cent expenditure on fruit increases with disposable time. Therefore, neither fruit nor ordinary snacks are considered time saving strategies in rewarding nutrition needs.
 - * The conclusion is that households spend more money on main meal and lunch/breakfast convenient foodstuffs and less on analogous non-convenient foodstuffs, when disposable time is restricted, and relatively more on main meal and lunch/breakfast convenient foodstuffs, when they have enough money. This indicates that the economic behaviour of households seems to be rather rational.

Unit expenditures on different categories of foodstuffs are also analysed by including the variables which determine disposable time (part I), i.e., the **number of persons** in the household, the presence of **pre-school or school children, working hours** and **educational level**, i.e., of the wife in couples. The objective of this modification is to obtain a more explicit picture of disposable time conditions.

The modified time and income analyses on food choice lead to the following findings:

- * Unit expenditure on non-convenient food is higher and convenient food expenditure is lower for couples than in single households. These findings are confirmed for expenditures on main meal foodstuffs as well as expenditures on lunch/breakfast food. Therefore couples seem to become more home-oriented than singles in their food pattern.
- * Another finding concerns biscuits, cakes, sweets (SN1), which are positively related to marital status in the sense that individuals in couples buy more of these snacks than single households. The explanation may be that eating these foodstuffs is subordinate to social events, rather than a compensation for being alone.

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- * The more children, the more unit expenditure on semi-convenient food, which appears to be explained by lunch/breakfast containing bread, dairy products, cereals, etc. For nearly all other categories, more children in the household mean less expenditure on convenient food as well as on non-convenient food. The explanation may be economies of scale or buying cheaper foodstuffs, as the number of household members increases.
 - * Households with pre-school and/or school children buy more semi-prepared stuffs for the main meal than those without children. School children mean less expenditure on fast food and eating out. Choosing more semi-prepared stuffs with pre-school or school children in the household may be seen as a moderate modernisation of the meal preparation in the household, partly substituting the fast food and eating out categories.
 - * Pre-school or school children in the household also increase the expenditure on the two kinds of snacks, though mostly the first snack category, and mainly in pre-school child families.
 - * The participation and the number of working hours in the labour market affect the food choice noticeably only in so-called double-career families who spend more on semi-preparation and fast lunch/breakfast foodstuffs than other couples and single households. The reason may be an emphasis on the lunch meal, buying more foodstuffs of these convenient categories.
 - * It was also found that families, where the wife works part-time on the labour market, spend significantly less money on snacks exclusive fruit, maybe because of a less time restrained every day life.

Household production is more or less efficient, depending on the **scale of the production**, the **experience** and **education** of the producers, the **technical equipment** available, and the **surrounding conditions**, all of them affecting the choice of foodstuffs with varying rates of preparation. By extending the models with these predictor variables, which may be perceived as proxies of productivity, their effect can be investigated.

The main findings are:

- * The housekeeper's age (the wife in couples) implies experience gained through life, with a higher productivity in household production as a consequence, which is confirmed by the finding that older individuals buy more non-convenient food and less convenient food than younger individuals. This holds for the main meal food, lunch/-breakfast foodstuffs and snacks.
- * More individuals in the household increases expenditure on preparation and semi-preparation main meal foodstuffs and decreases that of fast food and meals out. Total expenditure declines, which follows from economies of scale.

- * Expenditure on non-prepared food declines with more education in Denmark as well as in Sweden (Lindvall, 1989). Higher-educated Swedes buy more fast food than lower-educated Swedes, and Danes buy more semi-prepared food. The interpretation may be that the modernisation of the Danish food pattern is slower than the Swedish way of eating.
- * The number of household appliances determines time saving in production. More expenditure on non-prepared main meal foodstuffs and semi lunch/breakfast stuffs and less expenditures on fast lunch/breakfast was found with an increased number of appliances.
- * A microwave oven means more expenditure on fast meals and so does the ownership of dishwashers, whereas the possession of a freezer diminishes expenditure on fast meals, and even more expenditure on meals out. However, the ownership of a freezer also triggers a decline in expenditure on preparation and semi-preparation meals, which could partly be due to quantity discounts obtained.
- * The relationship between ownership of microwave ovens and expenditure on semi-preparation foodstuffs is positive, as expected, because these materials, like fast meals, are very appropriate for processing with this kind of technology. The correlation between owning a dishwasher and expenditure on preparation meals is also positive, because food preparation requires more semi-durables, which have to be cleaned, i.e., preferences for this kind of meal lead to investments in time-saving appliances.

The latter relationships are not significant, however, which is why the findings and argumentation have to be regarded with some reservation.

- * For double-career families the question of choosing the most proper time-saving strategy is especially relevant, and investments in appliances seem to be preferred instead of paying for hired help, i.e., registered spending on this service.
- * Surprisingly, hiring domestic help is positively related to expenditure on fast food and meals out, and the relationship to semi-convenient and especially non-convenient food is negative. Also the relation between foodstuffs for preparation of lunch/breakfast and servants is negative. The reason may be that servants mostly do other tasks than preparing food, i.e., take care of children, while the parents prepare the food or eat away from home.
- * Urbanisation may affect the prices of foodstuffs positively, which seems to be confirmed by the findings of less expenditure on nearly all kinds of foodstuffs, the more rurally household live.
- * Home-ownership also reduces expenditure on preparation meals, substituting expenditure on convenient foods. The explanation may be an enlarged household production with, among other things, the opportunity to grow vegetables in the garden.

For further analysis, the population was divided into **eating-outers** and **non-eating outers**, **fast fooders** and **non-fast fooders**, and **quick lunchers** and **non-quick lunchers**, by their registered expenditure on these food categories. Subsequently, the behaviour of the households in these different food-regimes, i.e., not the same as in part I) are compared pairwise.

The probability of eating out, buying fast food and quick lunch/breakfast is estimated by logit models, and the expenditures within the regimes by ordinary least square regression models.

The findings for **eating outers** are:

- * Increasing unit income gives rise to fewer eating outers, and, even more surprising, eating outers' expenditure declines with increasing income, which means that higher income families eat out more rarely, and when eating out they spend less money than lower income eating outers do. The explanation may be either a lower frequency and less expensive meals by rich people, a much lower frequency and more expensive meals, i.e., luxury behaviour, or a higher frequency and much less expensive meals.
- * The probability of eating out increases with disposable time.
- * The variables determining disposable time include the number of working hours on the labour market, and it was found that primarily women's part-time jobs increase the probability of eating out.
- * Comparing singles without children with couples, the probability of eating out increases, stays the same for families with pre-school children, and finally decreases significantly in families with school children. However, the life-cycle is even more marked in reality, because pre-school children often mean part-time working mothers, which increases the probability of eating out even more.
- * Not only the probability of eating out decreases significantly with school children, also the expenditure for this kind of meal is lower. Also the number of children has a negative effect in this respect.
- * The housekeeper's age as a proxy of experience, increases the probability of eating out, and eating outers' expenditure on meals away from home also increases with age, while the probability of being a fast fooders is not affected. Expenditure on fast food decreases significantly with the age of the fast fooders.
- * Household appliances and hiring domestic help both reduce the probability of eating out, and the expenditure for these kinds of meals. In this way households behave rationally in exploiting their potential capacities.
- * As opposed to what could be expected, families in rural areas eat out more frequently than urban household, and, being an eating outer, expenditure on this kind of meal

increases with ruralization.

- * Both in the eating outer and non-eating outer regimes, more income increases the purchasing of preparation foodstuffs significantly. At the same time, expenditure on fast meals decreases in non-eating outer households, while expenditure on eating out decreases in the eating outer regime. In this way, more purchasing power seems to imply that both regimes become more home-oriented, probably solving the time-pressure problem by investing in household technology.
- * Eating outers substitute preparation meals with meals away from home, when singles become couples. In both regimes children decrease expenditure on most of the categories of home foodstuffs. The explanation may be that of economies of scale in household production. However, some of the cost reductions are counterbalanced by more semi-preparation meals by non-eating outers with pre-school children. This also applies for non-eating outers with school children in the household. In this way semi-preparation food as well as economies of scale function as time-saving strategies.
- * For eating outers, the age of the housekeeper affects expenditure on fast food positively, while the level of education decreases expenditure on this category of foodstuffs. Non-eating outers buy more semi-preparation foods the higher the educational level, which leads to the conclusion that higher-educated people do not favour fast meals. Either the household chooses to eat out or semi-preparation meals, whichever is the most appropriate.
- * For eating outer households, appliances imply more expenditure on preparation foodstuffs, and the same does domestic servants. In both cases fast meals seem to be substituted, the relatively small expenditure on fast food taken into account.
- * Like the increasing probability of eating out the more rurally people live, expenditure on fast food also increases, while preparation food decreases. The same findings appear for home-owners as compared to tenants. The explanation may be buying more food informally or growing some foodstuffs on their own grounds.

The most obvious time-saving strategy from the consumer's point of view is buying fast food, therefore busy and money-rich families are **fast fooders** more often, than idle and money-poor families, and in general spend more money on that food category, which were some of the findings in part I.

By analysing the phenomenon in more detail here, the findings are:

- * The probability of being a fast fooder decreases with disposable unit income, which is contrary to expectations. For fast fooders, no unambiguous relationship between expenditure on fast food and income is found.
- * However, the effect of more disposable time is a decreased probability of buying fast food, which indicates rational time allocation on behalf of the consumers.

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- * The (weighted) numbers of persons in a household has the same effect on the probability of being a fast fooder as disposable time, indicating economies of scale, or less satisfaction achieved by this food category, the bigger the families are.
 - * The educational level seems to increase the probability of buying fast food slightly, as does being a homeowner. Being a fast fooder, expenditure increases with home ownership, and so does expenditure on away-from-home meals.
 - * Living in the country increases the probability of buying fast food more than living in urban areas. Expenditures on fast food meals increase with ruralization, as do expenditures on meals out. These findings are opposite to expectations, unless the phenomenon is caused by lower prices and alternative distribution channels on preparation foodstuffs in rural areas, which gives room for more expenditure on convenient food in household budgets.
 - * For the fast fooders, higher education means more expenditure on meals out and less on preparation meals, and more household appliances, as well as two full-time jobs mean less expenditure on meals out and more on preparation meals. A double-career family, highly educated, with modern time-saving technology, sometimes eating fast food, consequently has an ordinary food choice behaviour, because the underlying effects outweigh each other, it could be argued.

Finally, the population is separated into households with expenditure on fast lunch/breakfast foods and households with no such expenditure, i.e., **quick lunchers** and non-quick lunchers, and the findings are:

- * Being a quick luncher household decreases the probability of eating out, while the probability of eating fast food is not affected significantly.
- * The substitution between fast lunch/breakfast and meals out is greatly diversified, which is confirmed by the great differences in expenditure on the two food categories which is found for eating outers and quick lunchers.
- * The probability of buying fast lunch/breakfast decreases with unit income.
- * If households eat main meals away from home as well as quick lunch, they substitute preparation food for these foodstuffs, and therefore become away-from-home oriented households. And even more pronounced, households who buy fast food as well as quick lunch substitute eating out by preparation foodstuffs, which implies that these households are **really** away-from-home oriented with respect to food behaviour.
- * The older the housekeeper, the more likely it is that the household buys quick lunch/breakfast.

- * Marriage decreases the likelihood of bringing packed lunches to work, while having children increases this probability - making an extra packed lunch does not take long, because of economy of scale in production - though the overall number of household members raises the probability significantly.
- * Quick lunchers' expenditure on this food-category decreases with the number of children, and, as expected, it seems that having school children is the most effectual condition. Non-quick lunchers spend more money on semi-preparation lunch/breakfast foodstuffs including lunch box materials the more children they have, and, marriage decreases expenditure on these foodstuffs. Full-time working wives increase expenditure on semi-preparation stuffs, however, partly counterbalancing the effect of being married (part of a couple).
- * Higher educated people and home-owners spend less on preparation lunch/breakfast foods than lower-educated people and tenants belonging to the quick luncher regime.
- * Finally, the income effect on non-quick lunchers is much higher expenditure on semi-preparation foodstuffs, i.e., these households spend more on luxury packed lunches or at-home eating on weekends, it could be argued.

Using unit income and unit expenditure concepts leads to comparability of all households irrespective of their life-stage position. However, the consequence is obviously that information in the discrepancy between **single adults'** and **couples'** food choice behaviour is lost. Therefore such analyses were performed separately.

The findings for singles and couples separately are among others:

- * Singles spend much more on convenient meals than couples, which is due to differences in the fast food and the meals out categories. Non-convenient meals and semi-convenient meals are substituted by convenient meals. Lunch/breakfast expenditure on non-convenient foods is substituted by expenditure on convenient foodstuffs, when singles' life-stage is compared to that of couples.
- * The percentage of single households spending money on meals away from home (eating outers) is higher than the corresponding percentage for couples, whereas the proportion of households spending money on fast food and fast lunch/breakfast do not vary much between single adults and couples.
- * Adding other life-cycle components, eating out is 41% more likely for single adults aged 45 years or more, than for single adults under 45 years, and the likelihood of quick lunches is 57% higher for the older group. The probability of couples eating out and having quick lunch also increases with the housekeeper's age.
- * Surprisingly, gender has no significant effect in relation to the probability of buying convenient foodstuffs. The only finding is for eating outers, where women spend less

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- money than men on meals away from home, although the difference is not significant.
- * Expenditure on meals out decreases with the number of children in eating outer couples. The effect of children is entirely due to school children, who decrease expenditure on eating out.
 - * In single households, pre-school and school children increase expenditure on eating out, pre-school children significantly, which may be explained by specific socio-economic conditions. The probability of belonging to the eating outer regime, however, is only affected significantly in couples, where pre-school children increase the likelihood of eating out by 29%.
 - * In couples, the number of children decreases the probability of being a quick luncher by nearly 14%, i.e., packed lunches may be the substitute.
 - * Couples with part-time working women increase the probability of being an eating outer, while the probability of eating fast lunch/breakfast decreases. The interpretation may be that women's earnings are regarded as transitory income, filling the gap between consumption demand and income during the life-cycle stage where eating out is perceived as luxury consumption. The decrease in the likelihood of buying quick lunch corresponds to a more home-oriented food behaviour in the non-main meals. Households with full-time working wives were found to have a 45% lower probability of eating out than other kinds of households. Preferences for packed lunches substituting canteen lunches explains the behaviour appropriately, though other interpretations are reasonable as well.
 - * Singles' educational level decreases the probability of eating out, and increases the probability of buying quick lunch. The latter phenomenon is definitely due to a fairly labour-market oriented life-style, including more comfortable lunch arrangements. The education effect on the likelihood of eating out is combined with significantly decreasing expenditure on these foods with more education.
 - * Microwave ovens and/or dishwashers in couple households decrease the probability of eating out. Couples eating fast food increase expenditure on that kind of food significantly when possessing microwaves and freezers.
 - * Couples, as well as singles, eat out less frequently, when hiring a domestic servant.
 - * Urbanisation means less frequent meals away-from-home and quick lunches for singles and couples. When eating out, the effect of urbanisation is less expenditure on meals out.
 - * Finally, the probability of homeowners, singles and couples, buying fast food is bigger than that of tenants. Couples also increase the probability of eating quick lunch, when they own their home, though tenants being quick lunchers spend more on that food category than owners. Moreover, tenants eating the main meal away from home also
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spend more on that consumption than analogous home-owner households.

All the probit-estimations and regressions performed explain only a minor part of the variance in the data, which has to be taken into account when interpreting the findings. The quality of the data in the family budget survey is the main problem, but as long as they are the only available data, we are forced to base our empirical research work on these data.

9. References

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APPENDICES

Table A1. Unit expenditure on main meal

	prep.meals		semi-prep.meals		fast meals and meals out	
	B	RSD	B	RSD	B	RSD
	(N:1246)		(N:1246)		(N:1246)	
CONSTANT	-13125. a	0.132	-1904.054 ^a	0.156	-12071. a	0.120
LOGVINC	1457.451 ^a	0.108	199.640 ^a	0.134	278.522 ^a	0.103
COUPLES	386.892	0.627	28.496	1.457	-407.221 ^c	0.498
CHILD	-156.314	0.832	-27.271	0.815	-229.428 ^c	0.473
CHILDP	184.032	1.576	84.113 ^d	0.589	-220.587	1.097
CHILDSC	269.216	1.004	98.761 ^a	0.467	-356.325	0.633
PARTTIME	-18.442	13.569	9.458	4.522	-196.990	1.060
FULLTIME	-32.623	6.810	14.642	2.593	-81.747	2.267
EDUTIME	-25.274	2.221	11.281	0.850	12.169	3.850
Adj.R ²	0.0616		0.0449		0.1124	

Table A2. Unit expenditure on lunch/breakfast

	prep. lunch and breakfast		semi-prep.lunch and breakfast		fast lunch and breakfast	
	B	RSD	B	RSD	B	RSD
	(N:1246)		(N:1246)		(N:1246)	
CONSTANT	-5049.533 ^a	0.230	-3717.772 ^a	0.162	-3596.030 ^a	0.214
LOGVINC	684.310 ^a	0.153	443.841 ^a	0.122	396.988 ^a	0.175
COUPLES	264.894	0.611	-90.367	0.930	-388.960 ^a	0.276
CHILD	49.414	1.755	136.325 ^b	0.330	-100.503 ^d	0.573
CHILDP	-184.931	1.046	6.097	16.474	63.089	2.038
CHILDSC	40.677	4.431	-62.104	1.506	-65.988	1.815
PARTTIME	-57.145	2.919	38.673	2.239	-1.328	83.518
FULLTIME	42.867	3.455	90.753	0.847	179.515 ^d	0.548
EDUTIME	-11.702	3.199	4.953	3.924	-19.330	1.287
Adj.R ²	0.0354		0.0738		0.0540	

Table A3. Unit expenditure on snacks

	SN1		SN2	
	B	RSD	B	RSD
	(N:1246)		(N:1246)	
CONSTANT	-7485.432 ^a	0.117	-1673.516 ^c	0.439
LOGVINC	791.241 ^a	0.100	209.392 ^b	0.318
COUPLES	216.631 ^d	0.568	-45.937	2.235
CHILD	40.069	1.645	-4.210	13.068
CHILDPR	316.924 ^c	0.463	162.460	0.755
CHILDSC	179.234	0.764	117.761	0.970
PARTTIME	-229.297 ^d	0.553	-39.012	2.711
FULLTIME	-79.370	1.418	29.553	3.178
EDUTIME	13.533	2.102	-11.742	2.021
Adj.R ²	0.0932		0.0072	

Table A4. Unit expenditure on main meal - productivity variables

	prep.meals		semi-prep.meals		fast meals and meals out	
	B	RSD	B	RSD	B	RSD
	(N:1246)		(N:1246)		(N:1246)	
CONSTANT	-14757. a	0.127	-1983.030 ^a	0.164	-8716.285 ^a	0.182
LOGVINC	1518.927 ^a	0.106	203.565 ^a	0.137	1106.493 ^a	0.123
AGE	27.724 ^a	0.201	0.306	3.173	-9.737 ^c	0.487
UNITC	448.751 ^b	0.372	55.465 ^d	0.522	-717.126 ^a	0.198
EDUTIME	-56.447	0.984	11.124	0.867	-3.495	13.491
APPL	98.843	1.522	12.545	2.082	7.508	17.009
DOMSERV	-535.451 ^c	0.496	-81.674 ^d	0.565	394.121 ^d	0.572
URBAN	-198.828 ^a	0.288	-12.402	0.803	-131.366 ^b	0.371
OWNREN	-196.102	0.907	5.990	5.154	-161.145	0.937
Adj.R ²	0.0917		0.0463		0.1110	

Table A5. Unit expenditure on lunch/breakfast

	prep. lunch and breakfast		semi-prep.lunch and breakfast		fast lunch and breakfast	
	B	RSD	B	RSD	B	RSD
	(N:1246)		(N:1246)		(N:1246)	
CONSTANT	-7415.554 ^a	0.170	-3764.476 ^a	0.177	-2059.294 ^c	0.405
LOGVINC	805.116 ^a	0.134	446.227 ^a	0.128	331.534 ^a	0.216
AGE	19.610 ^a	0.191	-2.414	0.823	-11.488 ^a	0.217
UNITC	291.010 ^b	0.384	119.036 ^c	0.498	-221.305 ^b	0.335
EDUTIME	-20.884	1.784	7.849	2.513	-18.110	1.365
APPL	-19.805	5.096	47.340	1.128	-44.468	1.506
DOMSERV	-317.367 ^d	0.562	40.522	2.330	57.957	2.042
URBAN	9.016	4.274	-7.996	2.550	-48.106 ^d	0.531
OWNREN	-42.461	2.809	-50.149	1.259	-182.452 ^c	0.433
Adj.R ²	0.0548		0.0562		0.0762	

Table A6. Unit expenditure on snacks

	SN1		SN2	
	B	RSD	B	RSD
	(N:1246)		(N:1246)	
CONSTANT	-6796.613 ^a	0.142	-2280.167 ^b	0.353
LOGVINC	744.787 ^a	0.111	244.529 ^a	0.282
AGE	-8.976 ^b	0.320	4.645 ^d	0.516
UNITC	323.563 ^a	0.265	124.595 ^d	0.575
EDUTIME	19.257	1.483	-13.451	1.772
APPL	62.574	1.236	-39.688	1.627
DOMSERV	-115.422	1.184	-123.769	0.922
URBAN	-68.789 ^c	0.429	-28.096	0.877
OWNREN	-92.513	0.988	-83.756	0.911
Adj.R ²	0.0954		0.0095	

Table A7. Unit expenditure on different food categories for eating outers and non-eating outers being quick lunchers - two stage estimations ¹

Meals	Regime I (N:707)				Regime II (N:538)		
	At home		Fast	Away from home	At home		Fast
	Prep.	Semi-prep			Prep.	Semi-prep	
Independent variables ² :							
QULBDU	-477.443 ^b	-24.990	-54.642	-105.035	-15.844	-5.547	71.187
	(0.245)	(1.221)	(0.985)	(1.585)	(14.862)	(7.256)	(1.116)
Adj.R ²	0.0509	0.0367	0.0089	0.1135	0.1032	0.0698	0.0386

¹The probit estimation behind is estimated by model B, see table 36.

²The variables also include LOGVINC, COUPLES, CHILD, CHILDPR, CHILDS, PARTTIME, FULLTIME, EDUTIME and λ .

()relative standard deviations.

Table A8. Unit expenditure on different food categories for fast fooders and non fast fooders being quick lunchers- two stage estimations ¹

Meals	Regime I (N:763)			Regime II (N:482)			
	At home		Away from home	At home		Away from home	Fast
	Prep.	Semi-prep		Prep.	Semi-prep		
Independent variables ² :							
QULBDU	-496.796. ^b	-23.642	264.543 ^d	-32.352	-358.422 ^d	-26.237	108.786
	(0.367)	(1.315)	(0.511)	(2.030)	(0.586)	(1.425)	(1.666)
Adj.R ²	0.0712	0.0527	0.0994	0.0525	0.0562	0.0266	0.0835

¹The probit estimation behind is estimated by model B, see table 36.

²The variables also include LOGVINC, COUPLES, CHILD, CHILDPR, CHILDS, PARTTIME, FULLTIME, EDUTIME and λ .

()relative standard deviations.

MAPP publications

MAPP working papers

- No. 1: Grunert, K. G. & Baadsgaard, A. *Market-based Process and Product Innovation in the Food sector: A Danish Research Programme*, January 1992.
- No. 2: Thøgersen, J. *Fødevareinnovation og Emballage - Miljøkonsekvenser og Forbrugerreaktioner*, Marts 1992.
- No. 3: Bonke, J. *Choice of Foods - allocation of time and money, household production and market services*, September 1992.
- No. 4: Grunert, K. G. & Ellegaard, C. *The Concept of Key Success Factors: Theory and Method*, October 1992.
- No. 5: Harmsen, H. *Determinanter for Produktinnovationssucces*, November 1992.
- No. 6: Grunert, K. G., Nissen, L. & Wildenhoff, L. *Do Danish Food Companies Analyse their Competitors*, February 1993.
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- No. 8: Lassen, J. *Food Quality and the Consumer*, March 1993.
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Kristensen, P. S.(1992) Flying prototypes: Productions departments' direct interaction with external customers, *International Journal of Operations & Production Management*, 12 (7/8), 197-212.

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Furthermore there are a number of project papers, which are not available to the public.

The MAPP programme consists of the following 14 projects

1. Strategic Planning and Innovation Capability in the Danish Food Sector
Morten Kvistgaard & Kirsten Plichta, Copenhagen Business School; Lone Rossen, Biotechnological Institute
2. Innovation Capability as a Key Success Factor
Klaus G. Grunert & Hanne Harmsen, The Aarhus School of Business
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