QUALITATIVE ANALYSIS

RESEARCH METHODS (56354)

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Quantitative Versus Qualitative

Quantitative

123

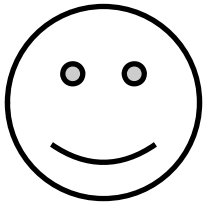
α β δ

Y=f(x)

Qualitative

ABC

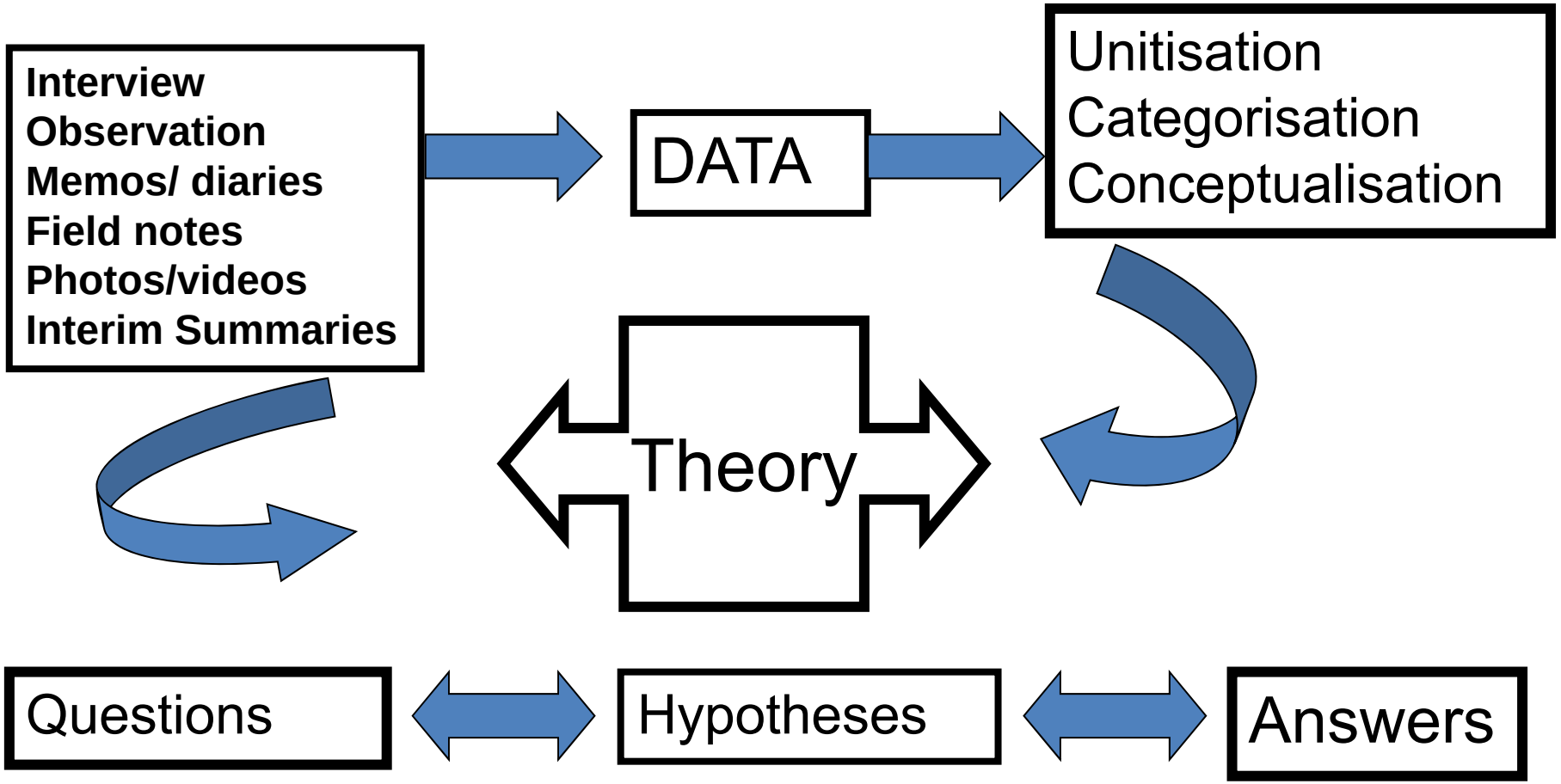
(words)



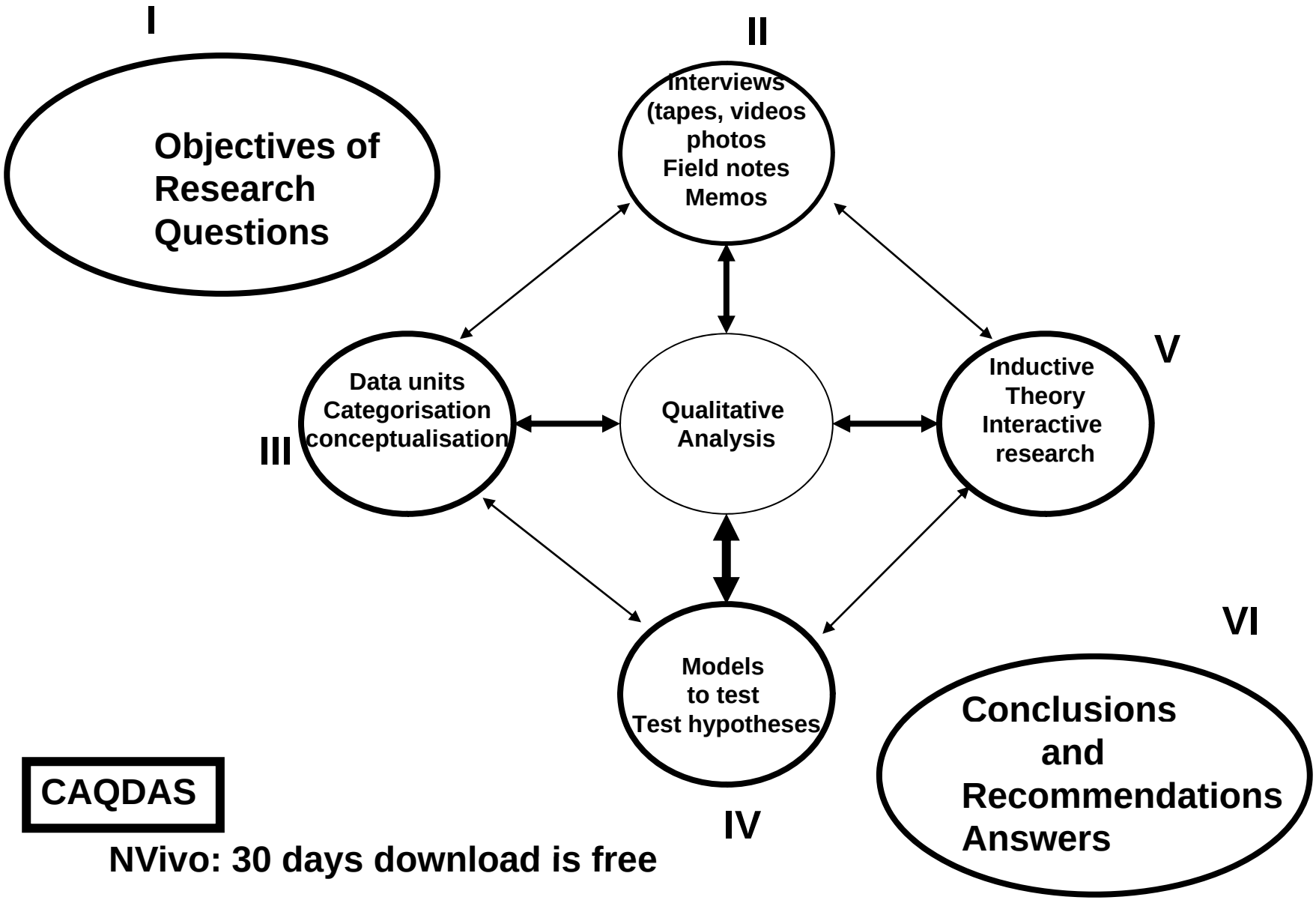
Construction of a Theory

Main Features of Qualitative Analysis

Meaning through words: Grounded Theory



Steps of Qualitative Research: Grounded Theory



CAQDAS

NVivo: 30 days download is free

http://www.qsrinternational.com/

Applying Qualitative Analysis: Applying Grounded Theory

- Interactive data:

– interview and field visits
(tapes, videos, photos scans)

- Data processing (coding)
  - Introducing units (open)
  - Creating categories (Axial)
  - Relationship between categories (Selective)
- Generating models
- Testing models
- Narrative analysis
- Writing reports/articles

Computer Aided Qualitative Data Analysis Software (CAQDAS)

- Systematic management of data in internal files, external files and memos
- Queries – data bits and frequency
- Coding (Nodes, Sets, Links, Models)
- Sets (cases)
- Nodes (free, Tree, cases)

Classification –
Relationship and Attributes

- Dynamic and static models

Ref: Strauss and Corbin (1998) Basics of Qualitative Research, Thousand Oaks, CA, Sage

A Simple Example Qualitative Analysis: Survey on Mobile Telephone

- Q1. Why do you like a mobile phone?
- Q2. Which brand is your favourite?
- Q3. When do you need a mobile phone?

- Q4. How can this help you in your daily work?
- Q5. What features do you like to be added in it?
- Q6. What is the maximum monthly amount you like to pay for a mobile phone?

Define the scope of study: Sample size, area, period of survey, interviewers

Categorisation: Buyer, Seller, Market, Area, Interviewers

Field Survey on Use of Mobile Phone by Semi Unstructured Interview: A prototype

Response 1

Q1. Why do you like a mobile phone?

It is easy to communicate from any where.
It is cheap and quick.

Q2. Which brand is your favourite?

Three

Q3. When do you need this?

When I travel. When I am at work. When I am at home.

Q4. How can this help you in your daily work?

It saves time and money. It helps in decision making

Q5. What features do you like to be added in it?

Phone, video services, information about the gems

Q6. What is the maximum monthly amount you like to pay for a mobile phone.

25 pounds.

Response 2

Q1. Why do you like a mobile phone?

It is easy to communicate from any where.
It is cheap and quick.

Q2. Which brand is your favourite?

Three

Q3. When do you need this?

When I travel. When I am at work. When I am at home.

Q4. How can this help you in your daily work?

It saves time and money. It helps in decision making

Q5. What features do you like to be added in it?

Phone, video services, information about the gems

Q6. What is the maximum monthly amount you like to pay for a mobile phone.

15 pounds.

Response 3

Response 4

Response 5

~~Response 6~~

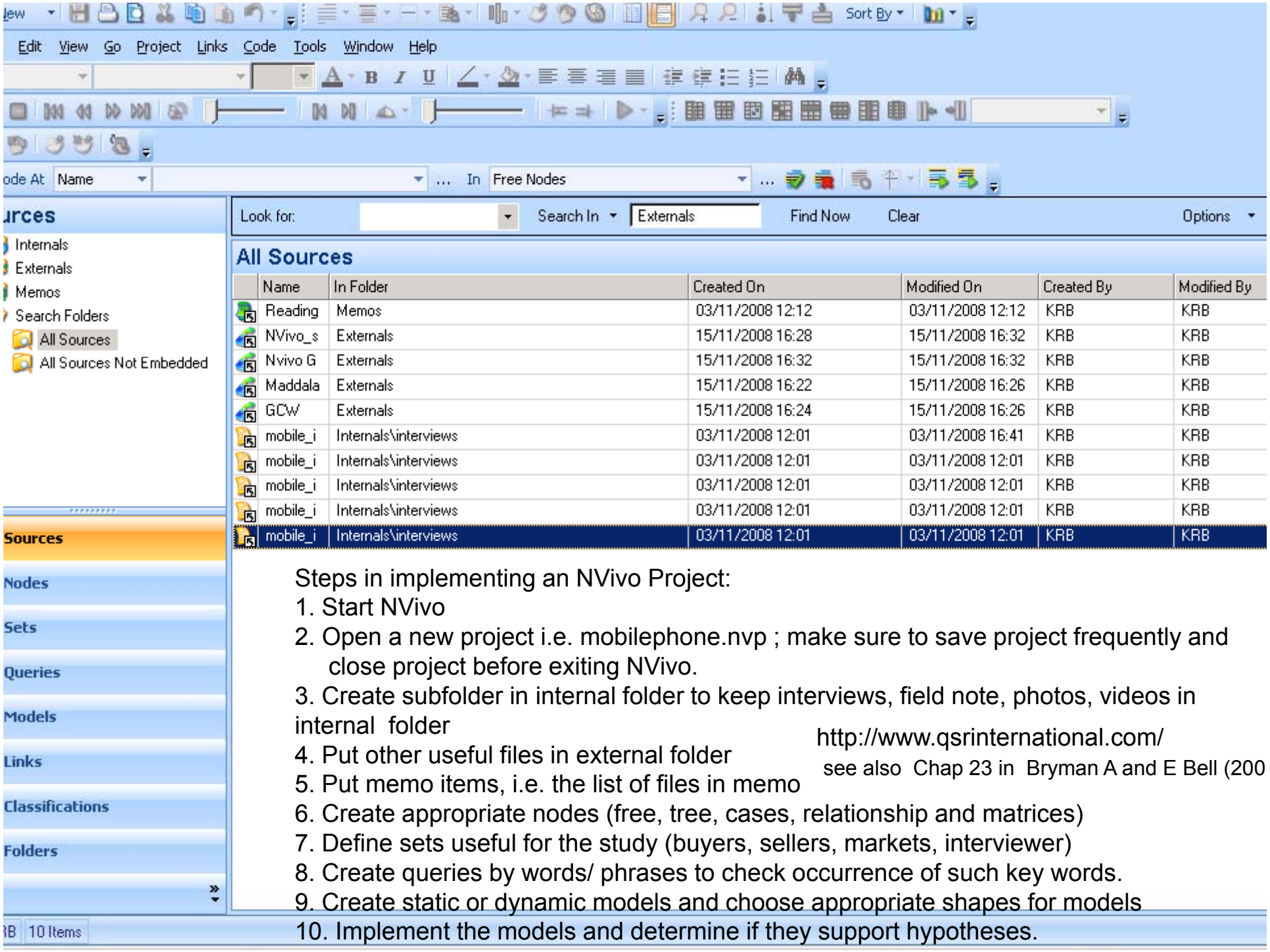
~~Response 7~~

~~Response 6~~

~~Response 8~~

~~Response 100~~

Nvivo file: mobilephone.nvp



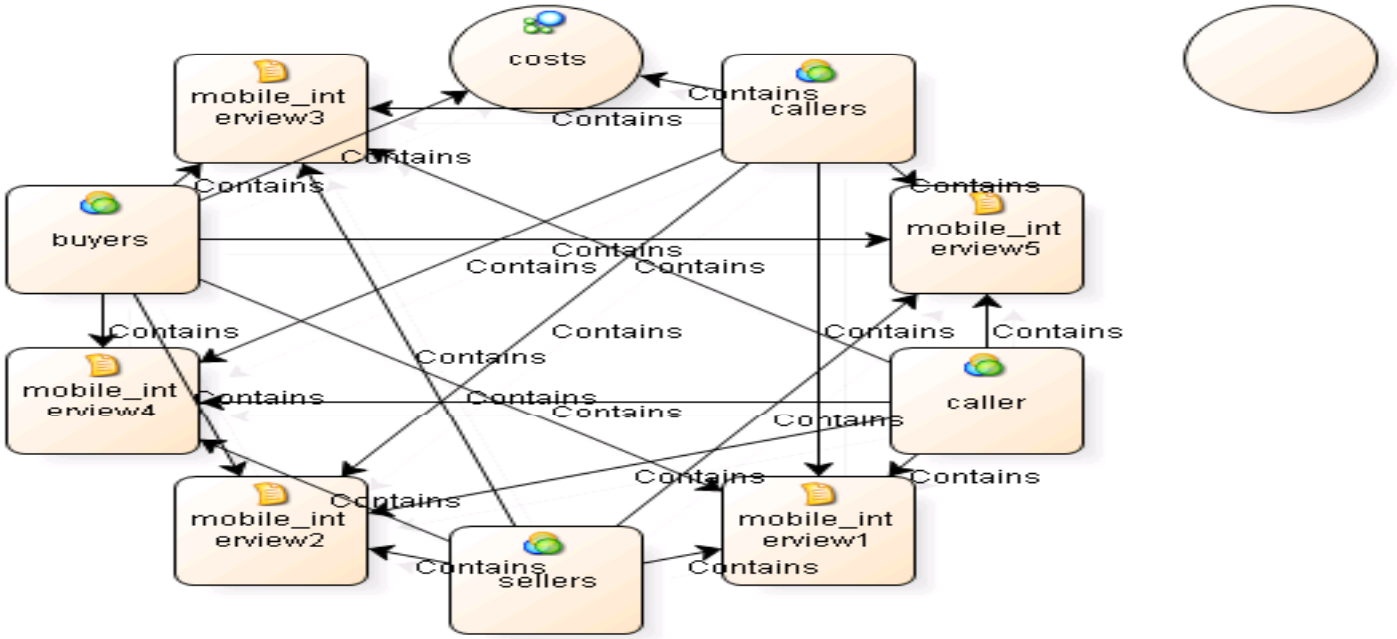
Steps in implementing an NVivo Project:

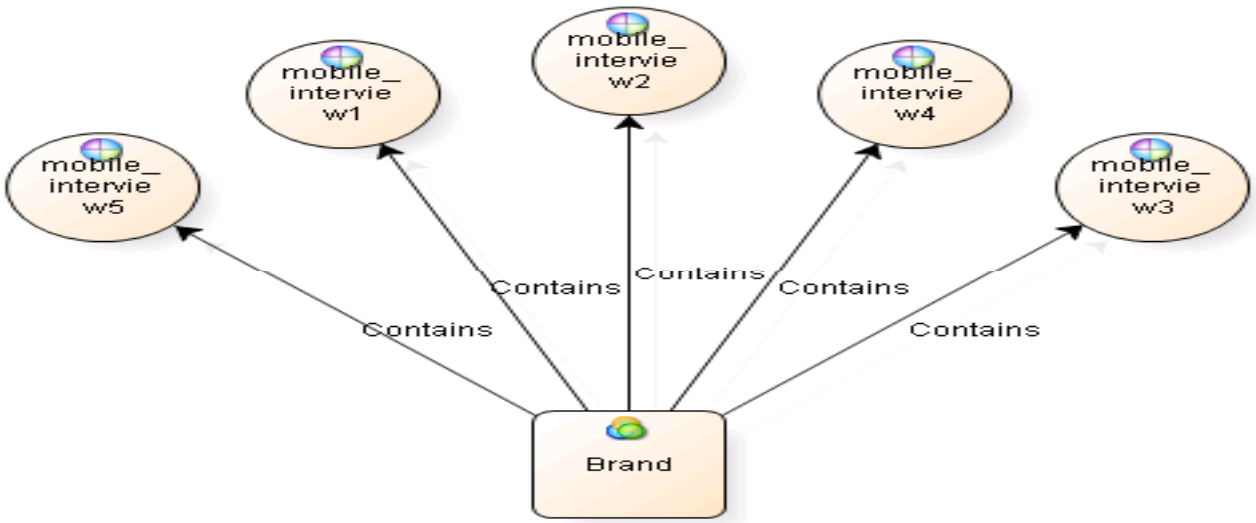
1. Start NVivo
2. Open a new project i.e. mobilephone.nvp ; make sure to save project frequently and close project before exiting NVivo.
3. Create subfolder in internal folder to keep interviews, field note, photos, videos in internal folder
4. Put other useful files in external folder
5. Put memo items, i.e. the list of files in memo
6. Create appropriate nodes (free, tree, cases, relationship and matrices)
7. Define sets useful for the study (buyers, sellers, markets, interviewer)
8. Create queries by words/ phrases to check occurrence of such key words.
9. Create static or dynamic models and choose appropriate shapes for models
10. Implement the models and determine if they support hypotheses.

http://www.qsrinternational.com/

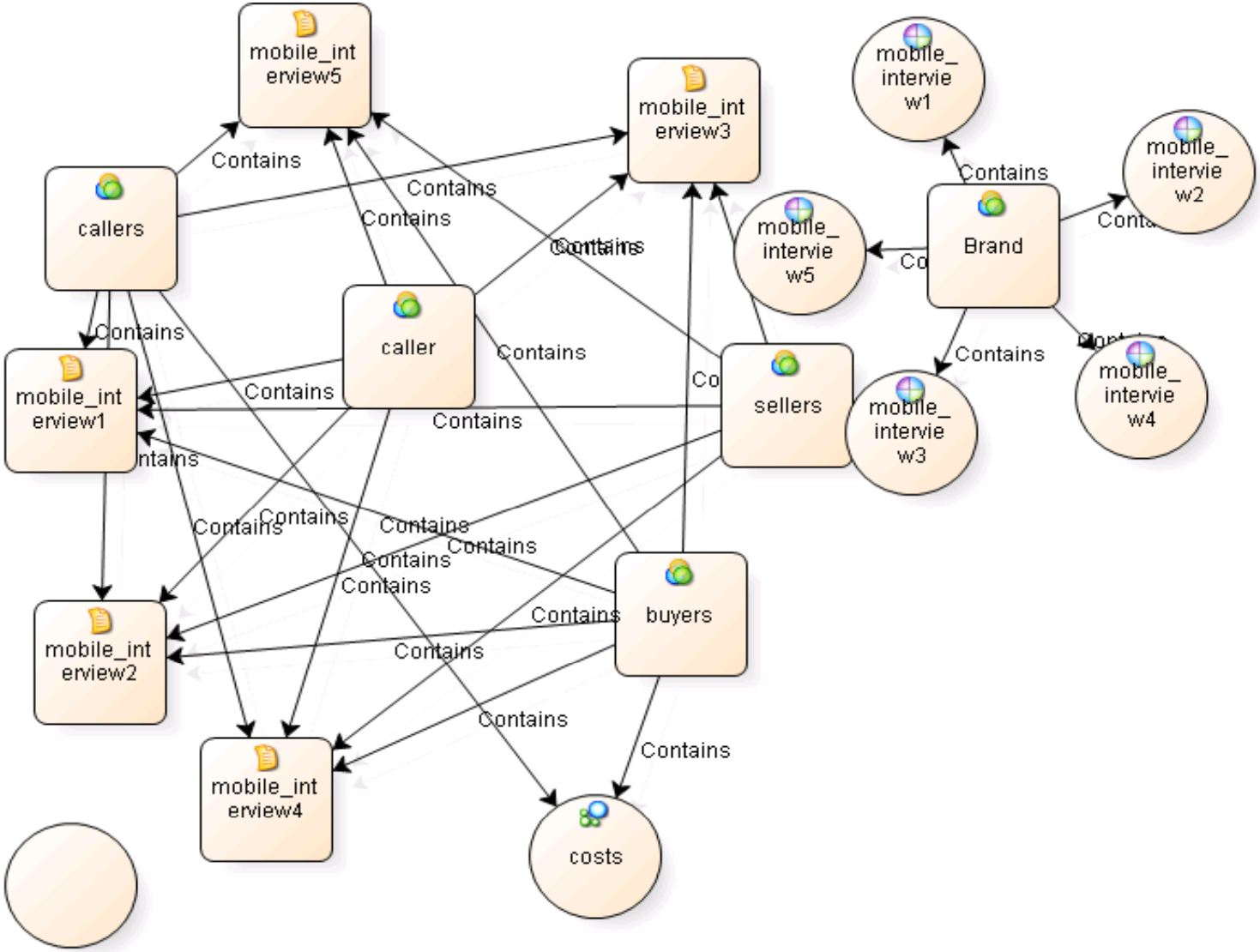
see also Chap 23 in Bryman A and E Bell (200

Dynamic Qualitative Model of Mobile Phone Market: Circular Structure

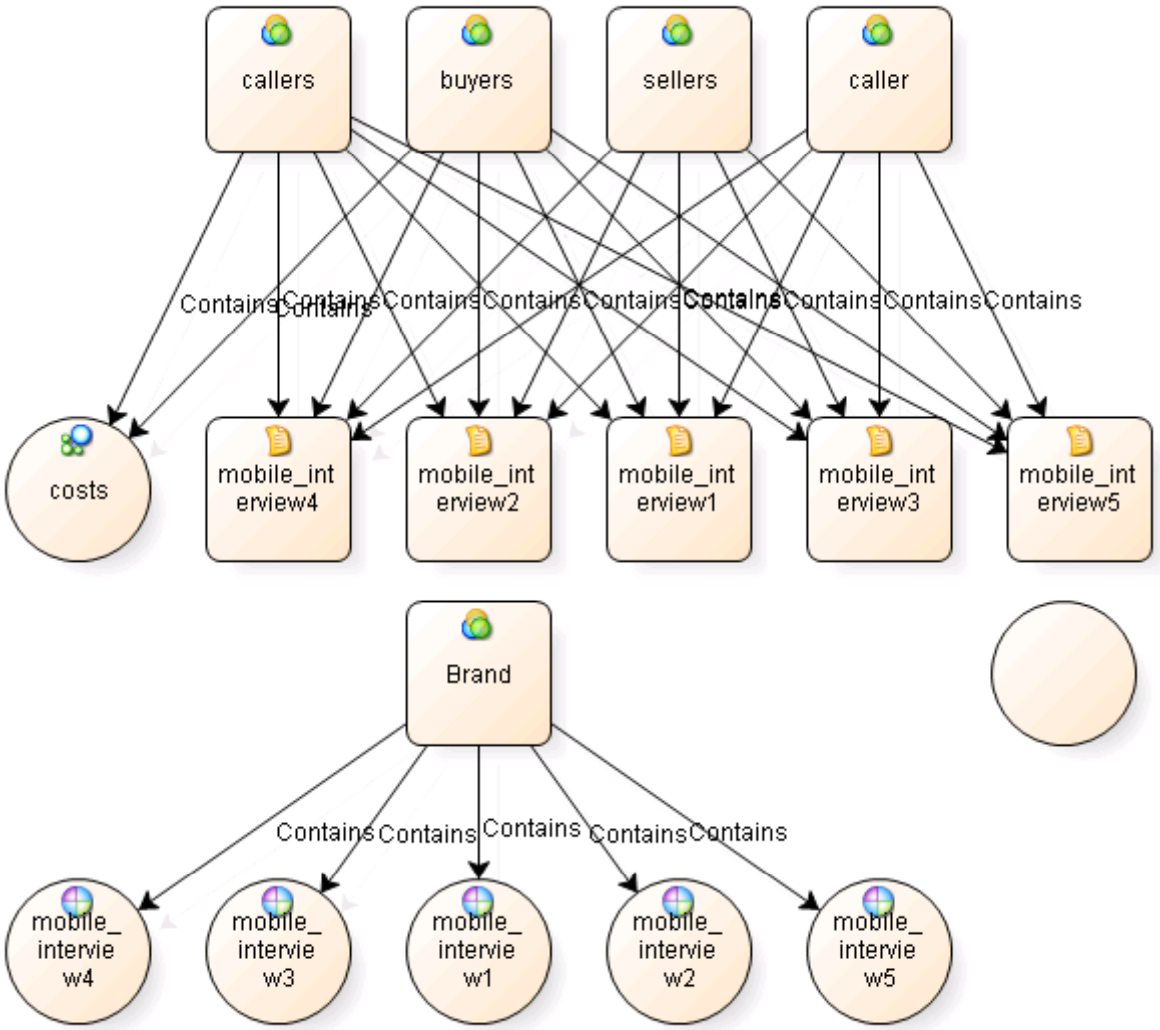




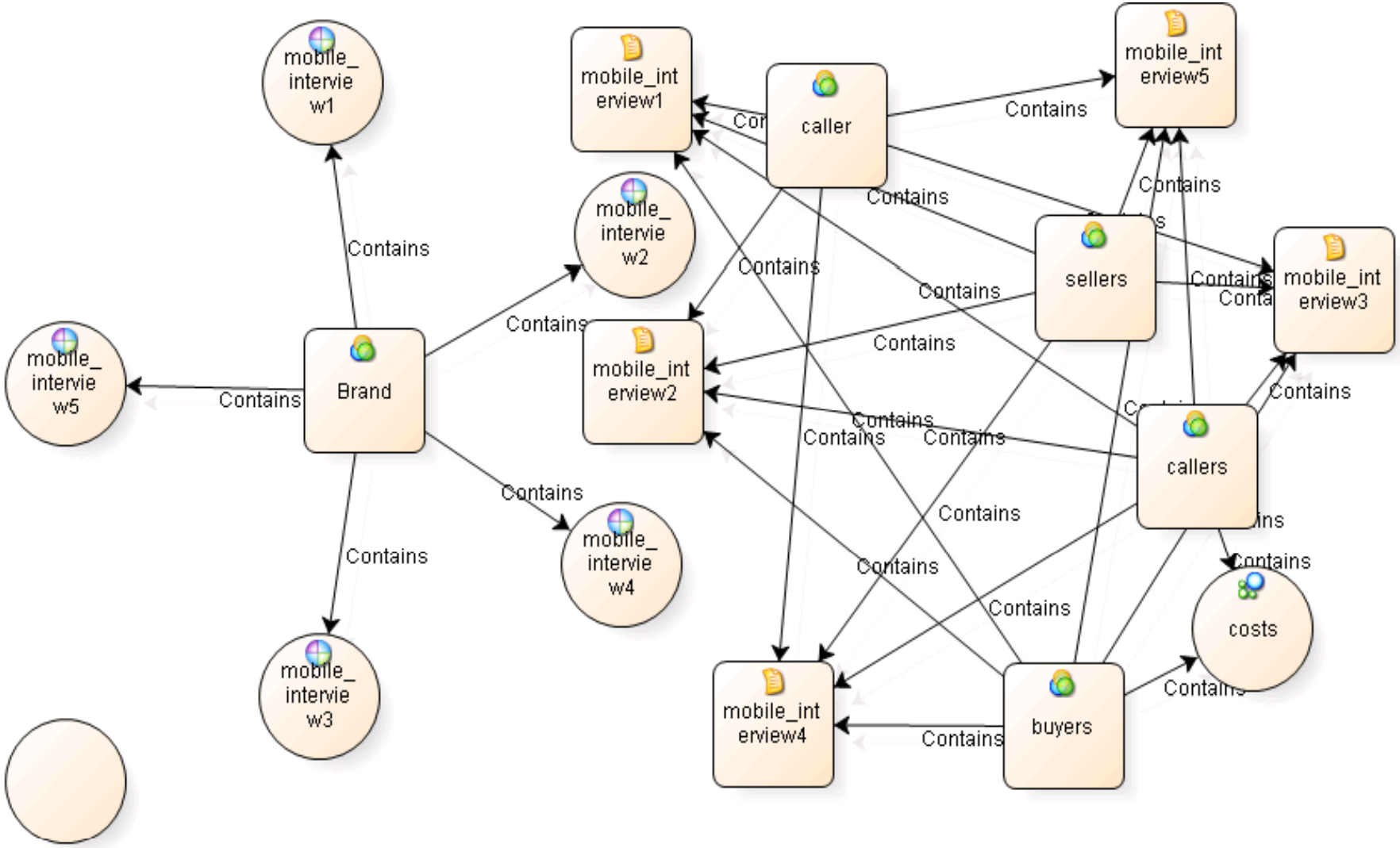
Dynamic Qualitative Model of Mobile Phone Market: Orthogonal Structure



Mobile Phone Market in A Hierarchical Structure



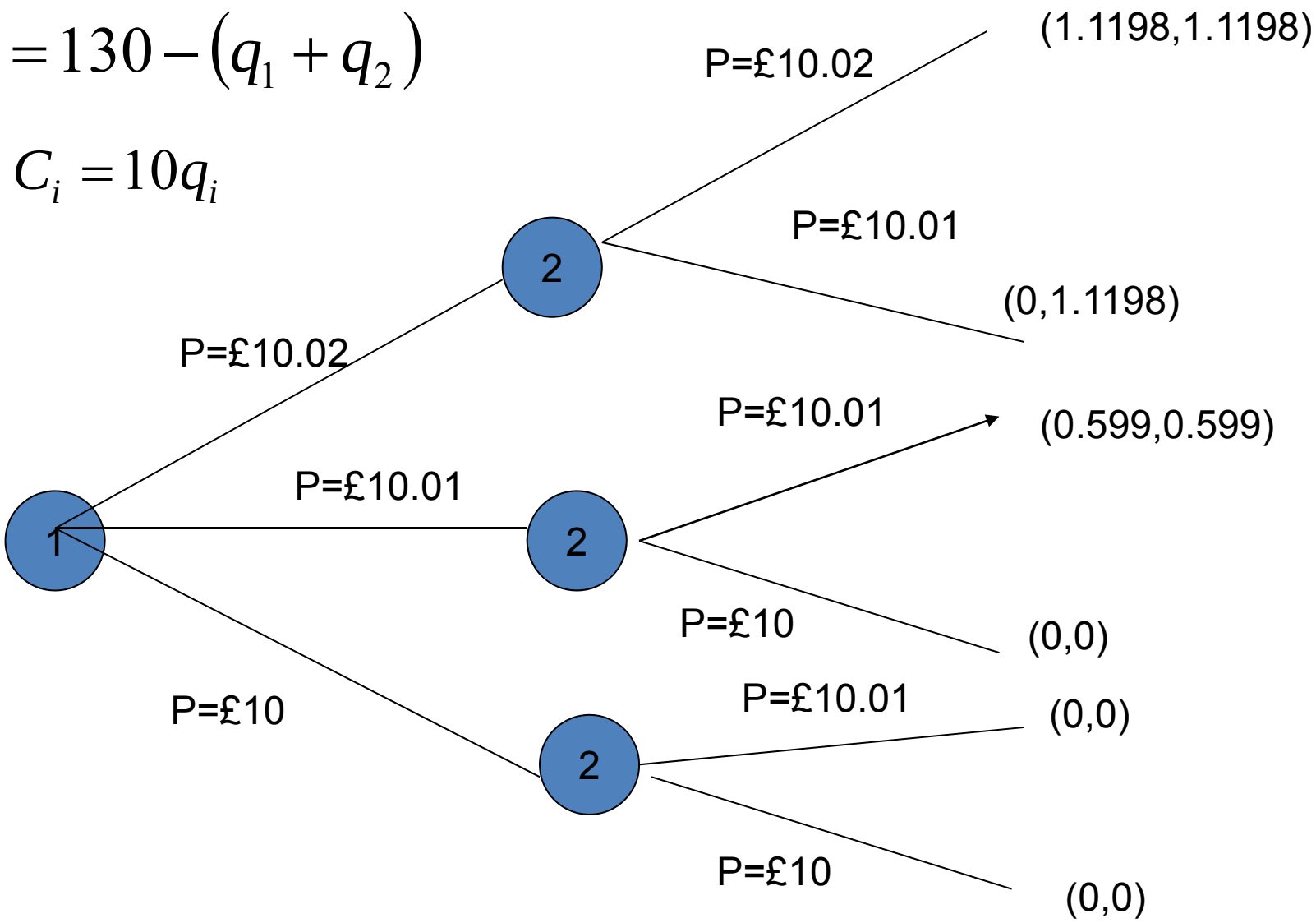
Dynamic Qualitative Model of Mobile Phone Market: Directed Structure



Cut-Throat Competition in Mobile Phone Market: Bertrand-Stackelberg

$$P = 130 - (q_1 + q_2)$$

$$C_i = 10 q_i$$



An Example of Structured Interview (Online Survey)

Survey on Effects of Smoking on Studies

I would appreciate if you could help me by answering the following survey questions. This study is just for academic purpose and information provided will strictly be kept confidential.

I. Background questions

1. Your gender

Male ☐ Female ☐

2. Age group

a.15-20 ☐ b.20-25 ☐ c. 25-30 ☐ d. above 30 ☐

3. Country/Region

II. Study behaviour questions

4. How many hours do you study and sleep now-a-days?

Study: a. less than three b. 3-5 ☐ c. 5-8 ☐ d. 8-10 ☐

Sleep: a. less than 5 b. 5-7 ☐ c. 7-8 ☐ d. 8-10 ☐ e. more than 10 ☐

4. How many pages do you read everyday?

a. less than 10 b. 10-20 ☐ c. 20-40 ☐ d. above 40 ☐

5. How many pages do you write everyday?

a. less than 5 b. 5-10 ☐ c. 10-20 ☐ d. above 20 ☐

6. How many years have you worked so far?

a. less than 1 Yr b. 1-3 ☐ c. 3-5 ☐ d. 5-8 ☐ e. above 8 ☐

I. Income and smoking behaviour

7. What is your total spending?

a. rent 250 b. drinks (tea,coffee or milk) …… c. all other items …..

9. Do you smoke? a. Yes ☐ b. No ☐

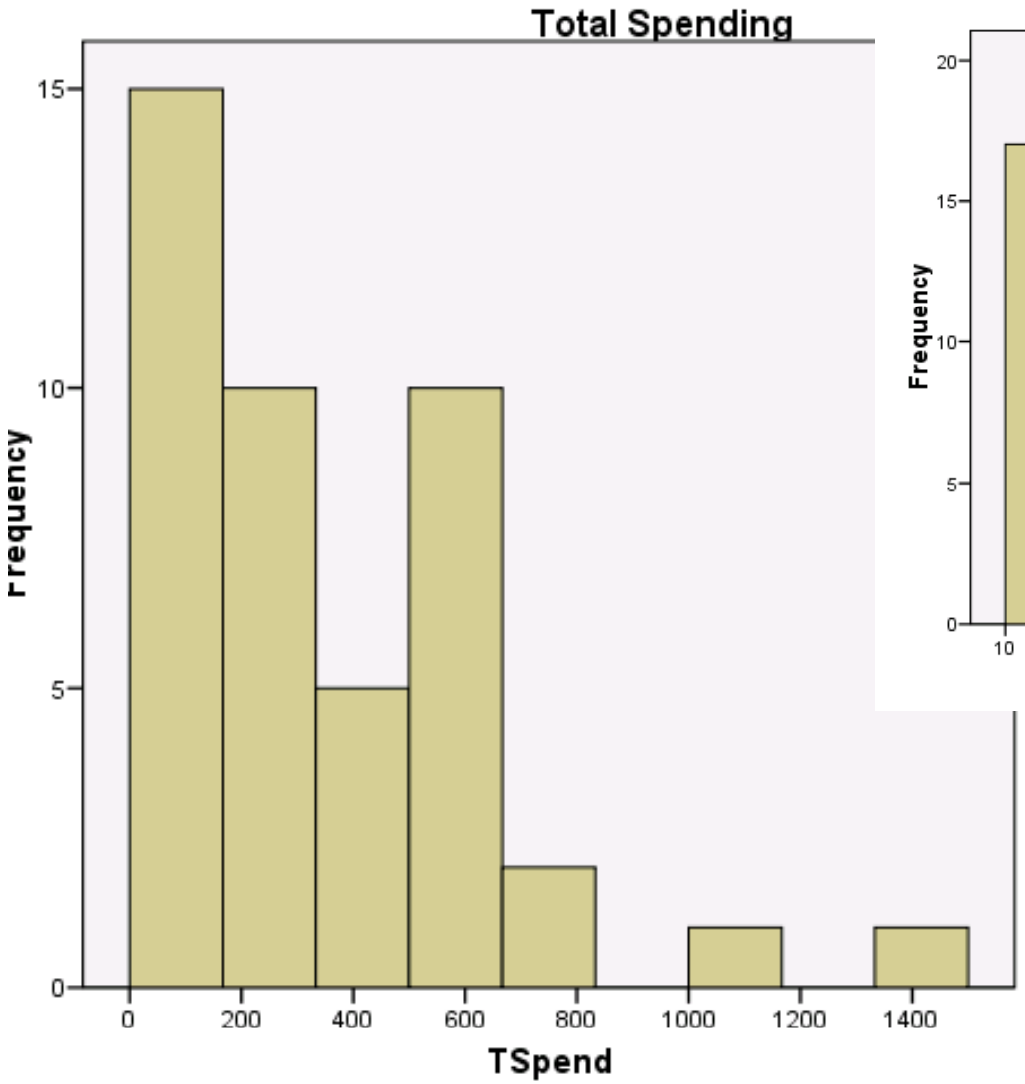
http://www.surveygalaxy.com/surPublishes.asp?k=PTYRGIHQWWHW

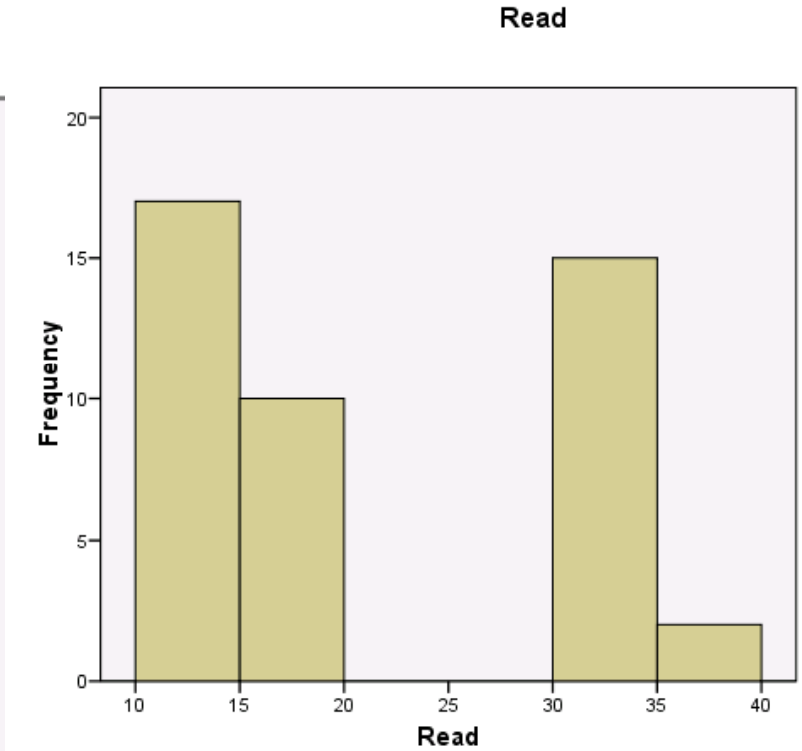
Web site: www.surveygalaxy.com Email: surveys@surveygalaxy.com

Coding of Survey for Database

Gender	Age	Country	Sleep	Study	Write	Read	Work	TSpend	Rent	Drink	Tuition	Other	Smoke
0	22.5	China	7.5	4	5	10	1	300	60	50	0	200	0
0	22.5	China	7.5	4	5	10	1	300	60	50	0	200	0
0	22.5	China	7.5	3	5	10	2	400	15	0	8500	3000	0
1	22.5	Cyprus	7.5	3	15	30	1	700	0	20	100	380	0
0	22.5	Germany	7.5	5	5	10	1	800	2400	0	3000	0	0
0	22.5	Germany	7.5	7	5	30	1	35	2808	40	0	50	0
0	22.5	China	7.5	4	5	15	1	450	50	5	0	0	1
1	22.5	China	7.5	3	5	30	1	300	60	20	0	0	0
0	22.5	Germany	7.5	7	5	10	1	200	70	0	110	0	0
1	30	UK	7.5	7	7.5	30	8	500	150	30	400	120	0
1	22.5	UK	7.5	4	7.5	15	4	500	150	30	400	120	0
0	22.5	France	7.5	4	5	10	705	0	300	30	0	40	0
1	22.5	Germany	7.5	3	5	10	1	1000	300	40	3000	0	0
0	22.5	China	7.5	5	5	15	4	250	0	30	3145	200	0
0	22.5	China	7.5	3	5	10	1	450	50	5	0	0	0
1	22.5	China	7.5	4	5	15	1	300	49	0	0	0	1
0	30	China	7.5	4	5	10	1	150	48	0	4250	0	0
1	22.5	China	7.5	3	8	30	8	500	150	5	400	120	0
0	30	China	7.5	3	5	10	1	150	48	30	4250	0	0
1	30	China	7.5	3	8	30	8	500	150	5	400	120	0
1	22.5	China	7.5	3	7.5	30	8	500	150	30	400	120	0
0	22.5	Nigeria	7.5	3	5	15	4	400	150	30	153	120	1
0	22.5	Nigeria	7.5	3	5	30	1	50	55	30	153	5	0
0	22.5	Burma	7.5	3	5	30	1	50	55	0	168	5	0
0	22.5	China	7.5	3	7.5	15	1	500	65	0	8000	60	0
1	22.5	China	7.5	3	20	40	3	100	65	0	0	500	1
1	22.5	China	7.5	3	5	10	8	40	130	10	8000	150	1
1	22.5	France	7.5	3	5	40	2	100	65	160	5000	500	1
0	22.5	France	7.5	3	5	30	3	520	2500	10	5000	500	0
0	22.5	France	7.5	3	5	30	3	500	2500	50	0	500	0
0	22.5	China	7.5	3	5	15	1	120	65	50	5	0	0
0	22.5	China	7.5	3	5	10	1	600	55	100	5	100	1
0	22.5	China	7.5	3	5	15	1	600	55	5	0	400	1
1	30	China	7.5	3	5	15	8	1500	175	5	150	100	0
0	22.5	UK	7.5	3	5	10	1	0	50	10	0	0	0
1	22.5	China	7.5	3	5	10	1	200	48	10	0	0	1
1	22.5	UK	7.5	3	5	10	1	200	48	25	150	0	1
0	22.5	China	7.5	3	5	10	1	400	50	25	50	0	0
0	22.5	China	7.5	3	5	30	1	80	1950	10	50	0	0
0	22.5	China	7.5	3	5	30	1	80	1950	5	50	50	0
1	22.5	China	7.5	3	5	30	1	200	48	5	0	0	0
0	22.5	China	7.5	3	4	15	8	0	55	0	0	0	1
0	22.5	China	7.5	3	5	12	8	0	55	0	0	0	1
1	22.5	China	7.5	3	5	30	1	200	48	0	0	0	0

Graphical Summary of Data

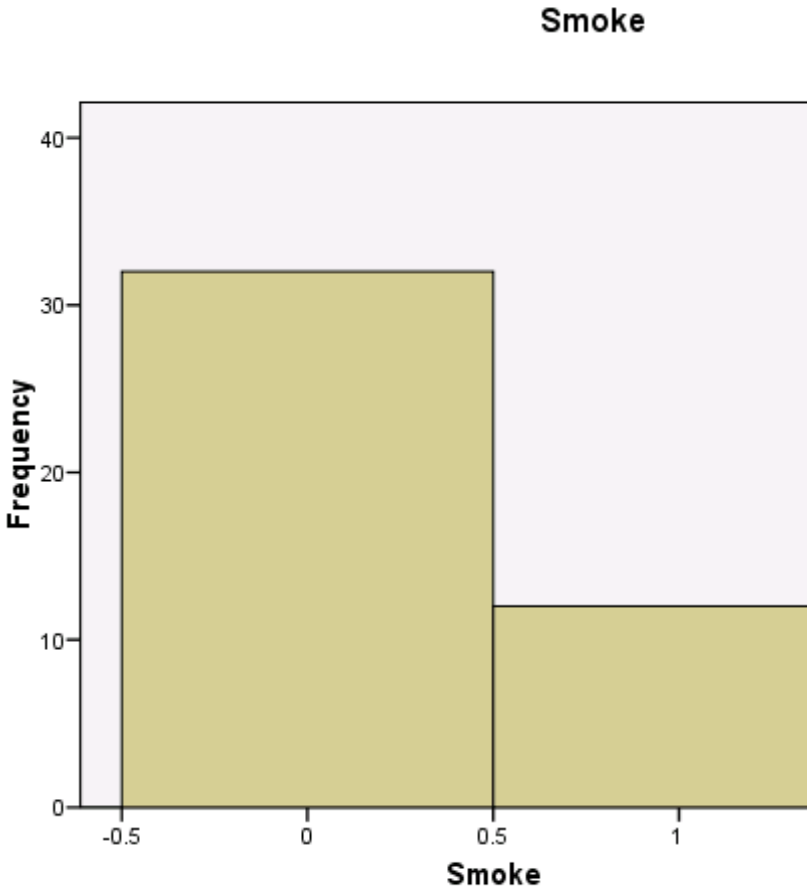


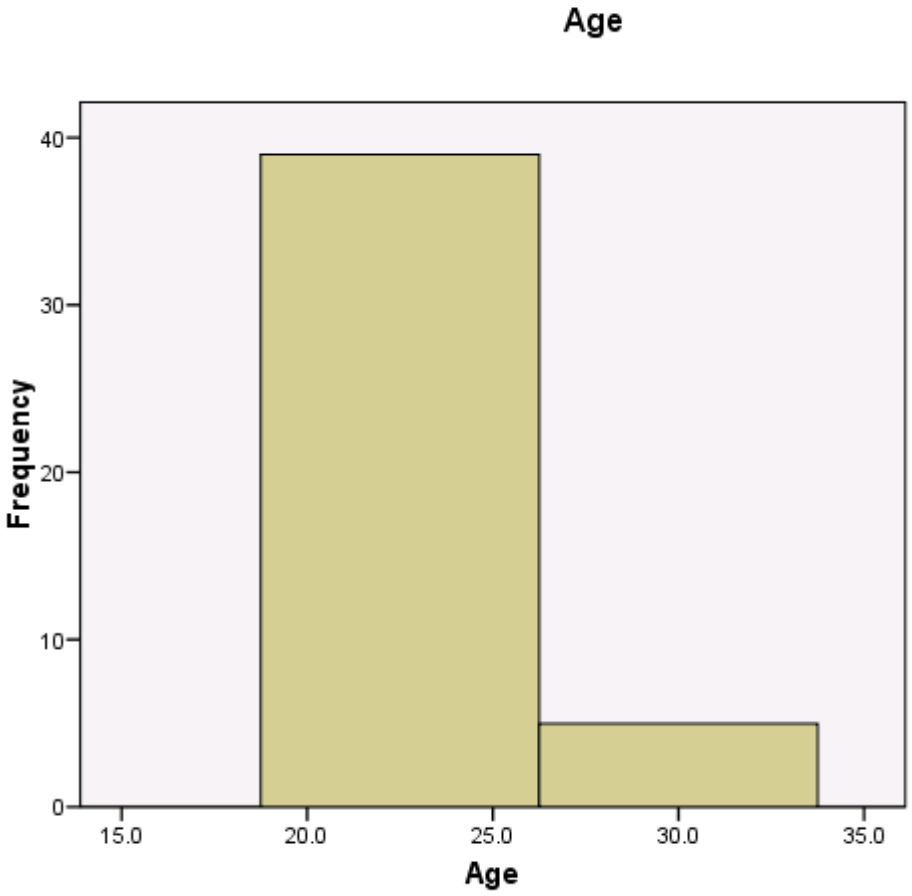


Mean =19.36
Std. Dev. =9.879
N =44

Mean =334.66
Std. Dev. =297.277
N =44

Graphical Summary of Data





Mean
Std. De
N

Country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Burma	1	2.3	2.3	2.3
	China	28	63.6	63.6	65.9
	Cyprus	1	2.3	2.3	68.2
	France	4	9.1	9.1	77.3
	Germany	4	9.1	9.1	86.4
	Nigeria	2	4.5	4.5	90.9
	UK	4	9.1	9.1	100.0
	Total	44	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	27	61.4	61.4	61.4
	1	17	38.6	38.6	100.0
	Total	44	100.0	100.0	

Smoke

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	32	72.7	72.7	72.7
	1	12	27.3	27.3	100.0
	Total	44	100.0	100.0	

Country * Smoke Crosstabulation

Count

		Smoke		Total
		0	1	
Country	Burma	1	0	1
	China	19	9	28
	Cyprus	1	0	1
	France	3	1	4
	Germany	4	0	4
	Nigeria	1	1	2
	UK	3	1	4
Total		32	12	44

Country * Gender Crosstabulation

Count

		Gender		Total
		0	1	
Country	Burma	1	0	1
	China	17	11	28
	Cyprus	0	1	1
	France	3	1	4
	Germany	3	1	4
	Nigeria	2	0	2
	UK	1	3	4
Total		27	17	44

Country * Age Crosstabulation

Count

		Age		Total
		22.5	30.0	
Country	Burma	1	0	1
	China	24	4	28
	Cyprus	1	0	1
	France	4	0	4
	Germany	4	0	4
	Nigeria	2	0	2
	UK	3	1	4
Total		39	5	44

Correlations

		Gender	Age	Sleep	Study	Write	Read	Work	TSpend	Rent	Drink	Tuition	Other	Smoke
Gender	Pearson Correlation	1	.157	.[a]	-.125	.391**	.362*	-.112	.262	-.290	.038	-.058	-.074	.143
	Sig. (2-tailed)		.308	.	.418	.009	.016	.467	.086	.056	.805	.706	.631	.355
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Age	Pearson Correlation	.157	1	.[a]	.159	.025	-.013	-.046	.275	-.127	-.096	.096	-.083	-.219
	Sig. (2-tailed)	.308		.	.303	.873	.932	.767	.071	.413	.537	.535	.592	.153
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Sleep	Pearson Correlation	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]
	Sig. (2-tailed)	.	.		.	.	.	.	.	.	.	.	.	.
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Study	Pearson Correlation	-.125	.159	.[a]	1	-.065	-.066	.068	-.047	.230	.002	-.089	-.109	-.203
	Sig. (2-tailed)	.418	.303	.		.677	.672	.663	.761	.134	.988	.567	.481	.187
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Write	Pearson Correlation	.391**	.025	.[a]	-.065	1	.436**	-.047	.088	-.132	-.118	-.083	.110	.057
	Sig. (2-tailed)	.009	.873	.	.677		.003	.761	.572	.392	.446	.590	.476	.711
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Read	Pearson Correlation	.362*	-.013	.[a]	-.066	.436**	1	-.143	-.115	.288	.142	-.163	.014	-.133
	Sig. (2-tailed)	.016	.932	.	.672	.003		.356	.459	.058	.359	.289	.930	.391
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Work	Pearson Correlation	-.112	-.046	.[a]	.068	-.047	-.143	1	-.169	-.021	.039	-.080	-.045	-.090
	Sig. (2-tailed)	.467	.767	.	.663	.761	.356		.272	.893	.800	.605	.774	.561
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
TSpend	Pearson Correlation	.262	.275	.[a]	-.047	.088	-.115	-.169	1	.041	-.020	.040	.088	-.178
	Sig. (2-tailed)	.086	.071	.	.761	.572	.459	.272		.789	.898	.795	.569	.247
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Rent	Pearson Correlation	-.290	-.127	.[a]	.230	-.132	.288	-.021	.041	1	-.009	.023	.003	-.252
	Sig. (2-tailed)	.056	.413	.	.134	.392	.058	.893	.789		.952	.884	.984	.099
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Drink	Pearson Correlation	.038	-.096	.[a]	.002	-.118	.142	.039	-.020	-.009	1	.041	.016	.145
	Sig. (2-tailed)	.805	.537	.	.988	.446	.359	.800	.898	.952		.793	.916	.348
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Tuition	Pearson Correlation	-.058	.096	.[a]	-.089	-.083	-.163	-.080	.040	.023	.041	1	.493**	-.038
	Sig. (2-tailed)	.706	.535	.	.567	.590	.289	.605	.795	.884	.793		.001	.805
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Other	Pearson Correlation	-.074	-.083	.[a]	-.109	.110	.014	-.045	.088	.003	.016	.493**	1	-.036
	Sig. (2-tailed)	.631	.592	.	.481	.476	.930	.774	.569	.984	.916	.001		.819
	N	44	44	44	44	44	44	44	44	44	44	44	44	44
Smoke	Pearson Correlation	.143	-.219	.[a]	-.203	.057	-.133	-.090	-.178	-.252	.145	-.038	-.036	1
	Sig. (2-tailed)	.355	.153	.	.187	.711	.391	.561	.247	.099	.348	.805	.819	
	N	44	44	44	44	44	44	44	44	44	44	44	44	44

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

Test of Factors that Influence in Smoking

Tests of Between-Subjects Effects

Dependent Variable: Smoke

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	1.330	1	1.330	6.669	.014
	Error	7.838	39.290	.199[a]		
Drink	Hypothesis	.001	1	.001	.003	.959
	Error	3.666	20	.183[b]		
Gender	Hypothesis	.329	1	.329	3.292	.202
	Error	.215	2.155	.100[c]		
TSpend	Hypothesis	4.184	19	.220	1.939	.279
	Error	.444	3.910	.114[d]		
Gender * TSpend	Hypothesis	.197	2	.098	.536	.593
	Error	3.666	20	.183[b]		

a. .480 MS(TSpend) + .018 MS(Gender * TSpend) + .502 MS(Error)

b. MS(Error)

c. .980 MS(Gender * TSpend) + .020 MS(Error)

d. .820 MS(Gender * TSpend) + .180 MS(Error)

Secondary Analysis of Qualitative Data

Secondary analysis offers rich opportunities not least because the tendency for qualitative researchers to generate large and unwieldy sets of data means that much of the material remains under-explored.

Qualidata, an archival resource centre

web site:

- www.essex.ac.uk/qualidata

its online catalogue - Qualicat—can be searched at the following address:

- www.essex.ac.uk/qualidata/data/catinput.html

Examples of Large Scale ESRC Studies with Qualitative Data

- Adult Learner Education Project (Lancaster-Liverpool and Blackburn) **Nvivo file: Adultlearner.nvp (Sept 2002 –March 2006); 142 Semistructured interviews; Blackburn-Lancaster-Liverpool;**

  Data from Barton, D. et al. (2008)
- Consumer behaviour project in Portsmouth (2500 interviews)

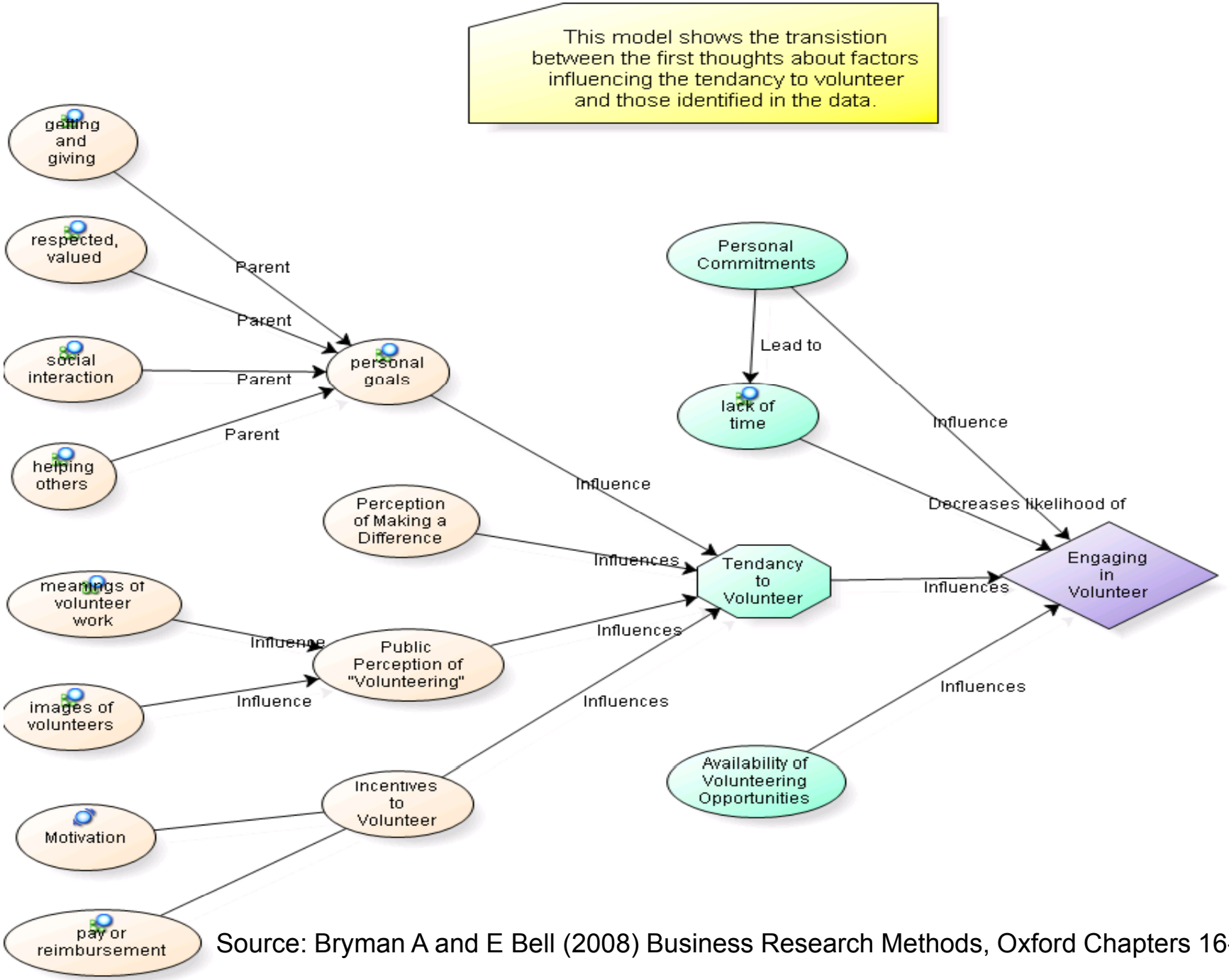
  Nvivo file: Retails.nvp
- Data from Clarke, I., Jackson, P. and Hallsworth, A. (2004)

Housing and Bank and Mortgage –Durham University (**Nvivo file: Housing_Bank.nvp (December 4-Feb 2007); 119 case studies**

Smith, S.J., Searle, B. and Cook, N., (2008)

- Volunteer to Disneyland Project (volunteer.nvp) from the Bryman and Bell (2008) ; Snowball Interviews

See External folder for proper acknowledgement for these ESRC projects



Source: Bryman A and E Bell (2008) Business Research Methods, Oxford Chapters 16-22.

Differences between Qualitative and Quantitative Methods

Qualitative	Quantitative
• Words	• Numbers
• Participants view point	• Researchers view
• Formulation of theory	• Testing Theory (F, T tests)
• Process	• Static
• Proximity of researcher	• Distant researcher
• Deep, psychological	• Reliable data
• Micro	• Macro
• Meaning	• Behaviour
• unstructured	• structured

Qualitative Aspects of Quantitative Model: Limited Dependent Variables and Probability Models

$$Y_i = \begin{cases} 1 & if\ event \quad occurs \\ 0 & otherwise \end{cases}$$

Events: Yes or No decisions;
Decision to buy or not to buy a certain product;
Invest or not to invest;
Hire or fire; Study or Work;
Prescribe or not to prescribe;
Choices: Buses, Trains, Plans or Cars to travel
morning, evening, daytime or night time calls.

There are mainly three types of limited dependent variable models

Linear probability model

Probit model

Logit model or multinomial logit or nested logit

Tobit Model basically Probit with Truncation or censoring

Qualitative Variables in Probability models
(Dummy dependent variables)

- yes or no vote on a particular issue
- to marry or not to marry
- to study further or to start a job
- to buy or not to buy a particular stock, or commodity
- choice of transportation mode to work (1 if a person drives to work, 0 otherwise)
- Union membership (1 if one is a member of the union, 0 otherwise)
- Owning a house (1 if one owns 0 otherwise)
- the labour force participation
  - (1 if a person participates in the labour force, 0 otherwise)
- Multinomial choices:
  - work as a teacher, or as a clerk, or as a self employed or professional or as a factory worker
- Multinomial ordered choices:
  - strongly agree, agree, neutral, disagree, strongly disagree

A Linear Probability Model

$$Y_i = \beta_1 + \beta_2 X_i + \varepsilon_i$$

Decision Y depends on X Variables and random terms.

Unknown parameters β_1 and β_2

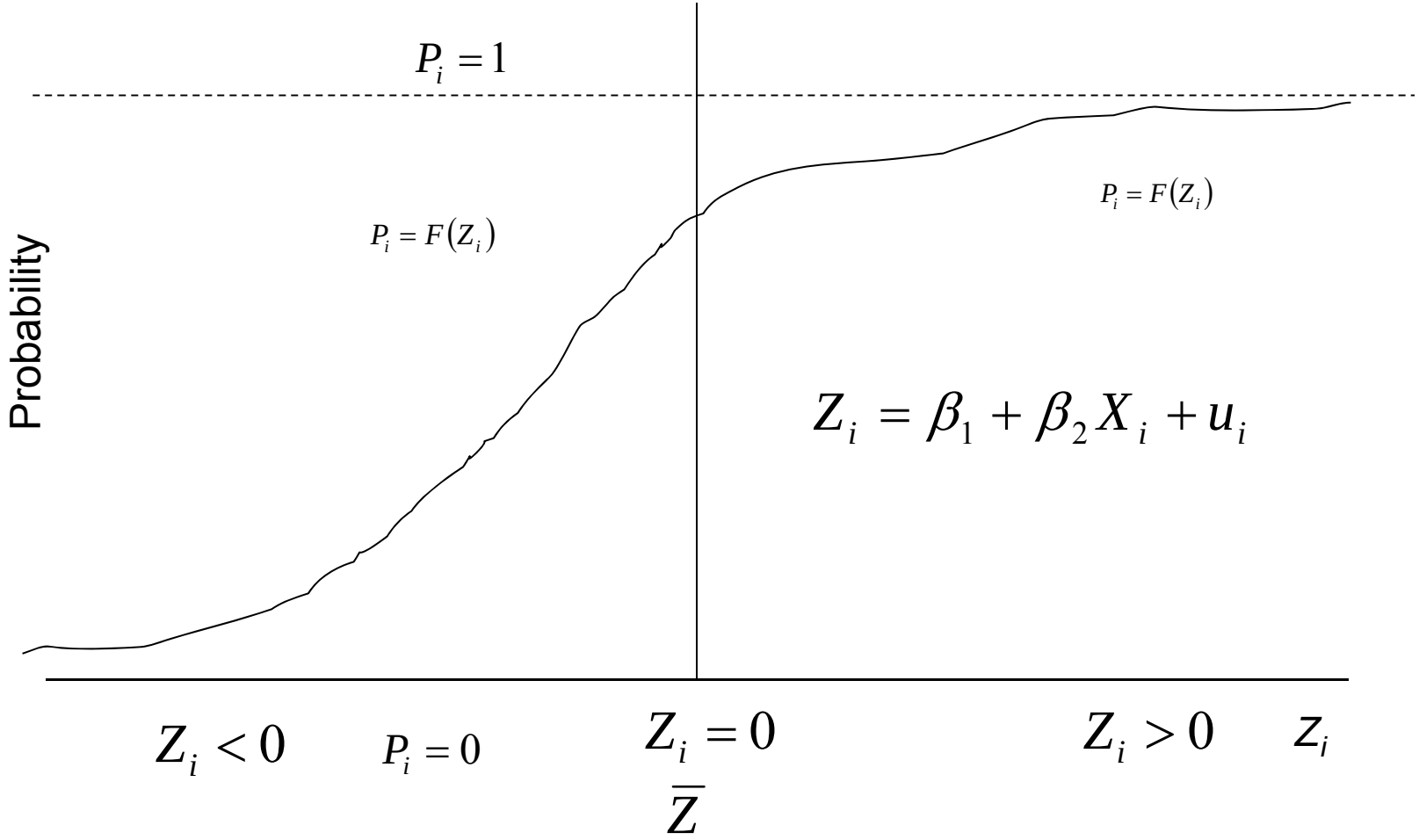
are estimated by an OLS with data on Y and X.

$$E\left[\left(Y_i = 1\right) / X_i\right] = \beta_1 + \beta_2 X_i = P_i$$

$$0 \le E\left(Y_i\right) = P_i \le 1 \qquad 0 \le P_i \le 1$$

Limitation: it does not guarantee that the probability lies inside (0,1) bands.

Probit Model



$$\Pr(Y_i = 1) = \Pr(Z_i^* \le Z_i) = F(Z_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{Z_i} e^{\frac{-t^2}{2}} dt = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_i + \beta_2 X} e^{\frac{-t^2}{2}} dt$$

Factors Influencing the Probability of Smoking

Parameter Estimates

	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PROBIT[a]	Gender	.064	.233	.274	.784	-.392	.520
	Age	-.144	.180	-.803	.422	-.496	.208
	Study	-.127	.183	-.696	.486	-.485	.231
	Tuition	.000	.000	-.077	.939	.000	.000
	Intercept	1.485	4.065	.365	.715	-2.580	5.551

a. PROBIT model: PROBIT(p) = Intercept + BX

Covariances and Correlations of Parameter Estimates

		Gender	Age	Study	Tuition
PROBIT	Gender	.054	-.059	.167	-.042
	Age	-.002	.032	-.045	-.003
	Study	.007	-.001	.033	.056
	Tuition	.000	.000	.000	.000

Covariances (below) and Correlations (above).

Estimated by the SPSS

Logit Probability Model

$$P_i = \frac{1}{1+e^{-Z_i}} \;;$$

$$Z_i = \beta_1 + \beta_2 X_i + u_i$$

$$1 - P_i = 1 - \frac{1}{1+e^{-Z_i}} = \frac{1+e^{-Z_i} - 1}{1+e^{-Z_i}} = \frac{e^{-Z_i}}{1+e^{-Z_i}} = \frac{1}{1+e^{Z_i}}$$

[e = exp = 2.718].

Ratio of odds:

$$\left[\frac{P_i}{1-P_i} = \frac{1+e^{Z_i}}{1+e^{-Z_i}} = \frac{e^{Z_i}\left(1+e^{Z_i}\right)}{e^{Z_i}\left(1+e^{-Z_i}\right)} = \frac{e^{Z_i}\left(1+e^{Z_i}\right)}{\left(e^{Z_i}+1\right)} = e^{Z_i} \right]$$

Taking log of the odds $\ln\left(\frac{P_i}{1-P_i}\right) = Z_i$

Factors Influencing the Probability of Smoking

Parameter Estimates

	Paramet	Estimate	Std. Error	Z	Sig.	95% Confidence Interva	
						Lower Bound	Upper Bound
LOGIT[a]	Gender	.185	.605	.305	.760	-1.001	1.370
	Age	-.231	.295	-.784	.433	-.808	.346
	Study	-.356	.510	-.698	.485	-1.356	.644
	Tuition	.000	.000	-.088	.930	.000	.000
	Intercept	2.088	6.708	.311	.756	-4.620	8.796

a. LOGIT model: LOG(p/(1-p)) = Intercept + BX

Covariances and Correlations of Parameter Estimates

		Gender	Age	Study	Tuition
LOGIT	Gender	.366	-.092	.160	.023
	Age	-.016	.087	-.097	-.013
	Study	.049	-.015	.260	.049
	Tuition	.000	.000	.000	.000

Covariances (below) and Correlations (above).

Estimated by the SPSS

Multiple choice models

- Wide range of choices in life:
  - Different brands of a particular goods such as cereals (Cherios, Kellogs, Cornflakes)
  - different subjects in the business school such as economics, marketing, finance, business, accounting, management
  - in the university such as science, engineering, medicine, mathematics, philosophy, politics or history, arts;
  - ordered probit or ordered logit for choice of bonds such as
  - AAA BBB; orders are used to rank the outcome.
- survey questions with ranking.

Multinomial Logit Model

Let $P_{i,j}$ denote the probability of choosing alternative J by individual i,.

There are J alternatives and N individuals.

$$\sum_{i}^{J} y_{i,j} = \sum_{i}^{J} P_{i,j} = 1$$

McFadden (1974)

$$L = \prod_{i=1}^{T} P_{i,1}^{y_{i,1}} P_{i,2}^{y_{i,2}} P_{i,3}^{y_{i,3}} \ldots\ldots P_{i,J}^{y_{i,J}}$$

Individuals make a choice to maximise utility; such utilities are specific to individual and unobserved factors $U_{i.j} = \overline{U}_{i.j} + e_{i.j} = X'_{i,j}\beta + e_{i.j}$.

Errors $e_{i,j}$ need to have Weibull distribution a multinomial logit.

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Errors $e_{i,j}$ need to have Weibull distribution a multinomial logit.

Multinomial Logit with Random Utility Model

Probability that the choice i is made when J alternatives were available implies

$$P_{i,1} = \Pr\left[U_{i.1} > U_{i.2} \; and \; U_{i.1} > U_{i.3} \quad ....and \quad U_{i.1} > U_{i.J} \right]$$

$$P_{i,1} = \Pr\left[e_{i,2} < U_{i.1} - U_{i.2} + e_{i,1} \; and \; e_{i,3} < U_{i.1} - U_{i.3} + e_{i,1} ..and \quad e_{i,J} < U_{i.1} - U_{i.J} + e_{i,1} \right]$$

$$P_{i,1} = \Pr\left[e_{i,2} - e_{i,1} < U_{i.1} - U_{i.2} \quad and \; e_{i,3} - e_{i,1} < U_{i.1} - U_{i.3} ..and \quad e_{i,J} - e_{i,1} < U_{i.1} - U_{i.J} \right]$$

$$P_{i,j} = \frac{\exp\left(X'_{i,j}\beta\right)}{\sum_{j=1}^{J} \exp\left(X'_{i,j}\beta\right)}$$

Weibull errors:

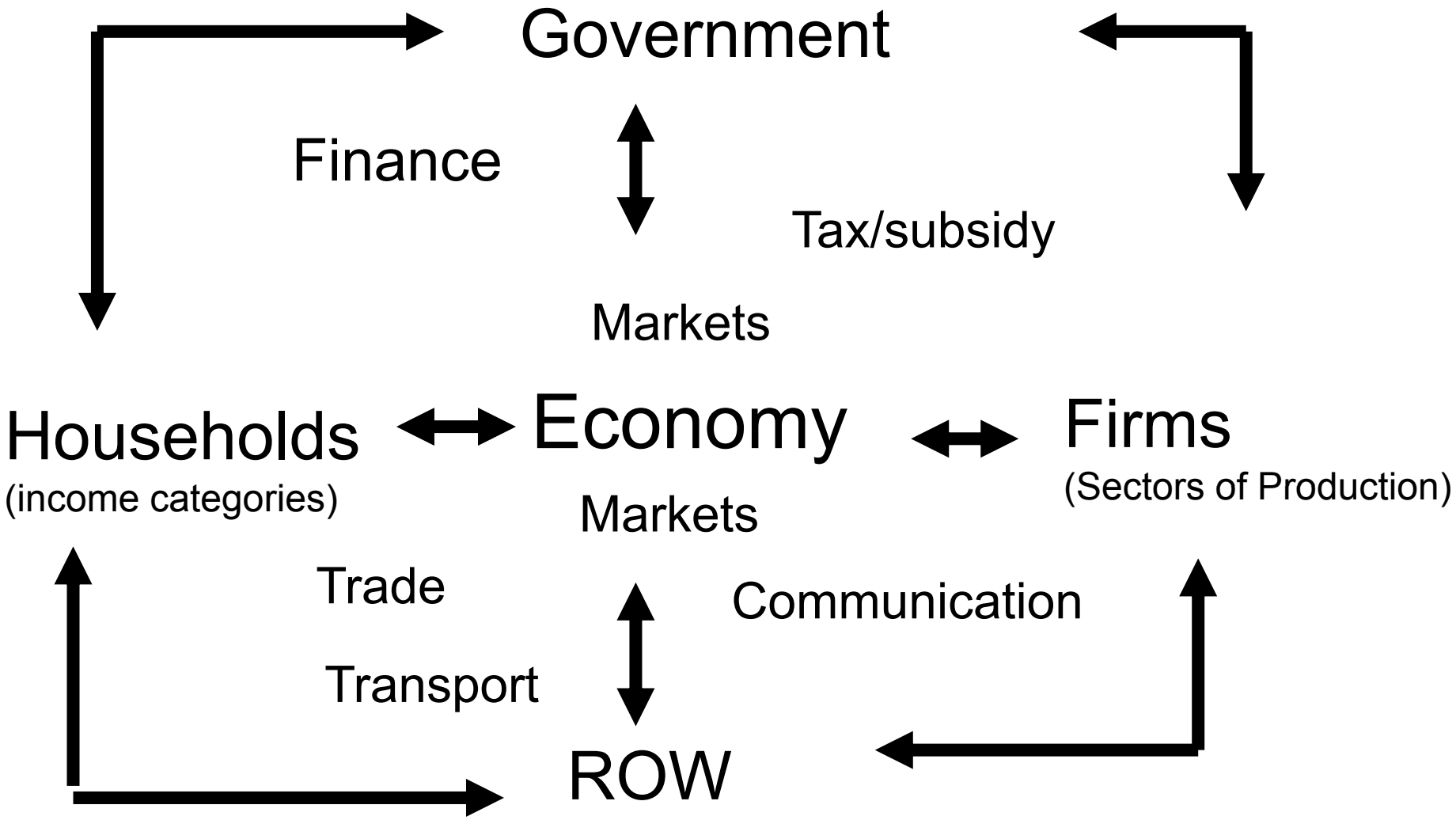
$$\Pr\left(e_{i,j} < \varepsilon\right) = \exp\left(-\exp\left(-\varepsilon\right)\right)$$

Probability of train rather than bus, plane or a car in travel.

Triangulation of Research Methods
Qualitative and Quantitative Analysis

Model of an Economy

Big Markets
Consumption of Households
Production by Small, Medium and Large Firms
Equilibrium in Goods and Factor Markets
Tax, Transfer, Public Goods and Debt
Money, Finance and Price System



General Equilibrium Models Assume Clearing of all Markets

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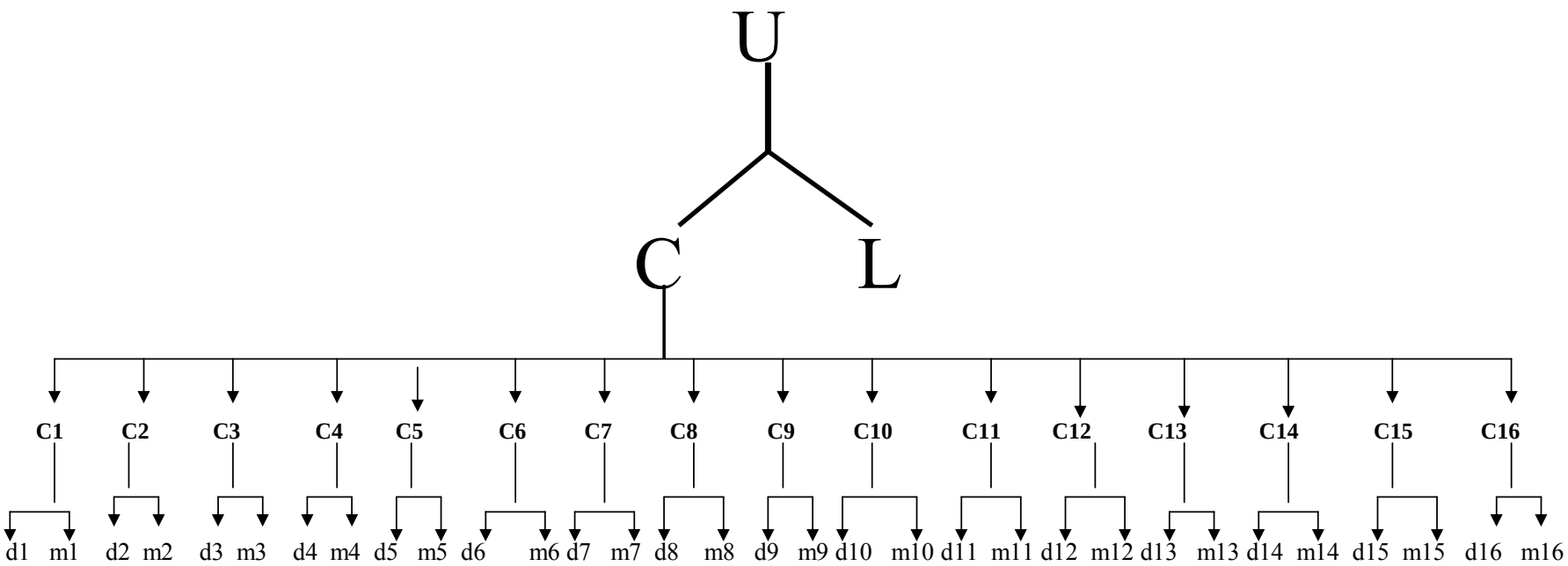
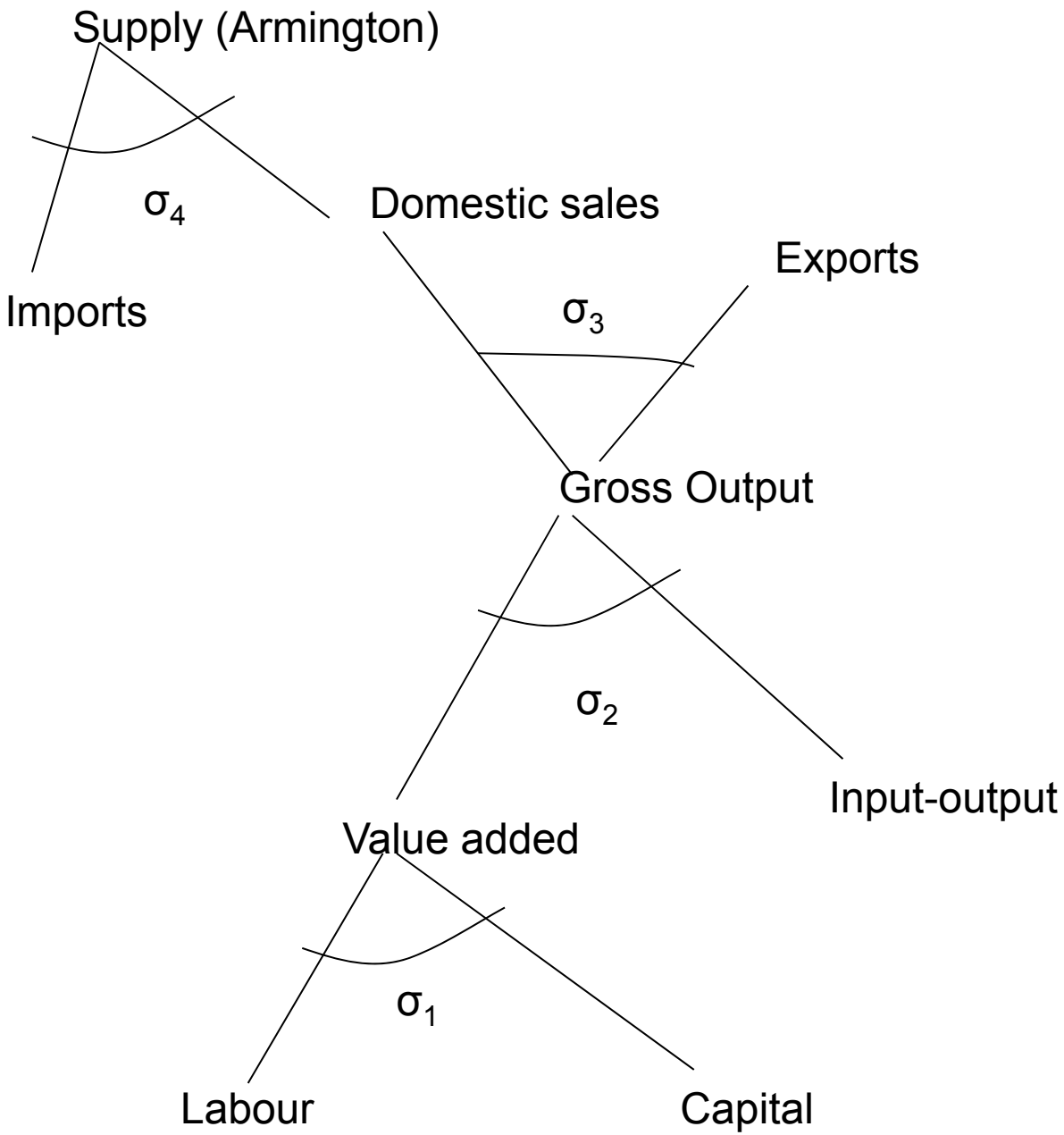
Nesting Structure in utility functions used in the UK model



Notation:
U = Utility
C = Composite consumption good
L = Leisure
C1..C16 = Sectoral composite
d1..d16 = domestic supply for consumption
m1..m16 = imports for consumption

Nesting of production and trade in the GE Model of UK



Analysis

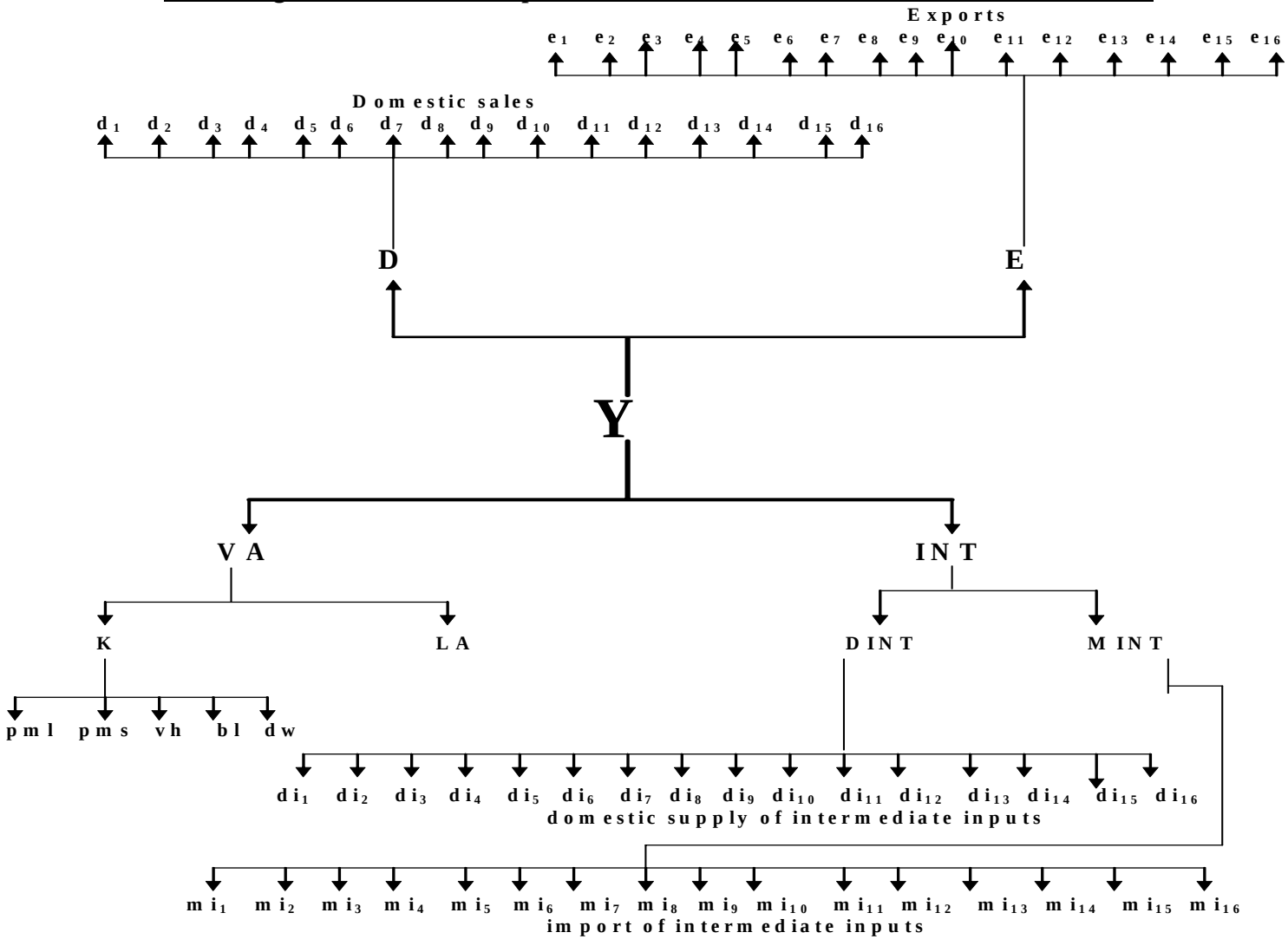
↓

Comparative Static

and

Dynamic

Nesting Structure in production used in the UK tax model



Notations:

Y = output
D = domestic sales
E = Exports
K = Composite capital
LA = labour
di_1..di_{16} = domestic intermediate inputs
mi_1 .. mi_{16} = imported intermediate inputs

VA = value added
INT = intermediate inputs
DINT = domestic intermediate inputs
MINT = Import of intermediate inputs

pml = plant and machinery long life
pls = plant and machinery short life
vh = vehicles
bl = buildings
dw = dwellings
e_1..e_{16} = exports
d_1..d_{16} = domestic sale

Competitive Equilibrium: Prices and Quantities such that

- Households maximise life time utility subject to their wealth constraint.
- Investors maximise profits subject to arbitrage conditions in capital markets.
- Producers minimise costs subject to technology constraints.
- Prices adjust until unit profits are zero in all production sectors.
- Markets for goods and services clear.
- Revenue and expenditure of government balance (in each time or over period).
- Trade is balanced in each period or over time.
- Economy adjusts towards its steady state and grows at the steady state rate beyond the model horizon T.

References

- Barton, D. et al. (2008) *Adult Learners' Lives, 2002-2005* [computer file]. Colchester, Essex: UK Data Archive [distributor], March . SN: 5758.
- Bhattarai (2008) Economic Theory and Models: Derivations, Computations and Applications, Serials Publications, New Delhi, ISBN: 978-81-8387-141-9.
- Bryman A and E Bell (2008) Business Research Methods, Oxford Chapters 16-22.
- Clarke, I., Jackson, P. and Hallsworth, A. (2004) *Retail Competition and Consumer Choice, 2002-2004* [computer file]. Colchester, Essex: UK Data Archive [distributor], Dec., SN: 5049.
- Paul E. Green, Frank J. Carmone, David P. Wachspress (1977) On the Analysis of Qualitative Data in Marketing Research Journal of Marketing Research, Vol. 14, No. 1 (Feb., 1977), pp. 52-59
- G. S. Maddala (1991) A Perspective on the Use of Limited-Dependent and Qualitative Variables Models in Accounting Research The Accounting Review, Vol. 66, No. 4 (Oct., 1991), pp. 788-807
- Saunders M, P. Lewis and A Thornhill (2008) Research Methods for Business Students, Prentice Hall.
- Smith, S.J., Searle, B. and Cook, N., (2008) *Banking on Housing; Spending the Home, 2004-2007* [computer file]. Colchester, Essex: UK Data Archive [distributor], July. SN: 5849.
- **HUBS Research Memoranda**

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