Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics

Bachelor Thesis

**ECONOMIC ANALYSIS OF HEALTH ASPECTS OF
MILK CONSUMPTION**

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BACHELOR THESIS ASSIGNMENT

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Agricultural Economics and Management

Thesis title
Economic Analysis of Health Aspects of Milk Consumption

Objectives of thesis
Evaluate, by the means of economic analysis, the negative and positive externalities of milk consumption.

Methodology
Create an insight into the negative externalities of milk consumption using literature study in the theoretical part of the thesis.
A questionnaire research used to give answers to basic questions in the thesis.
Evaluate economically the negative and positive externalities of milk consumption in the analysis part of the thesis.

Schedule for processing
1/2011 - 9/2011: Literature review
9/2011 - 3/2012: Analysis, Thesis writing

The proposed extent of the thesis
30 - 40 pages

Keywords
Milk consumption, Milk, Dairy, Cow milk, Milk consumption externalities, Milk consumption function, Economic analysis, Health hazards of milk consumption..

Recommended information sources
Průchová Jarmila et al. Pravda o mléce ? jak ji potvrzuje věda. Hradec Králové: SVÍTÁNÍ, 2003. ISBN 80-86198-43-X.
Oski Frank. Don´t Drink Your Milk. Brushton: TEACH SERVICES, 1996. ISBN 978-1-57258-628-4.
Schauss Alex. Diet, Crime and Delinquency. Berkeley: PARKER HOUSE, 1980.
Robbins Anthony. Unlimited power ? a black choice. New York: FIRESIDE, 1997. ISBN 0-684-82436-1.
Kushi Michio. The Teachings of Michio Kushi. Becket, Massachusetts: ONE PEACEFUL WORLD PRESS, 1993. ISBN 0-9628528-9-9.

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Last date for the submission
březen 2012

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Prague March 22. 2012

Statutory declaration:

I declare that my thesis "ECONOMIC ANALYSIS OF HEALTH ASPECTS OF MILK CONSUMPTION" was worked out by myself, alone, under the supervision of the head of the thesis and using literature and other information sources that are cited in the work and listed in the bibliography at the end of the thesis. As the author of the thesis, I further declare that I did not violate any copyrights of any third parties.

In Prague, on 29th March 2012

Acknowledgement:

I would like to thank, in this way, to the head of my bachelor thesis, Ing. Petr Procházka, MSc, Ph.D., for his vocational guidance in its processing.

ECONOMIC ANALYSIS OF HEALTH ASPECTS OF MILK CONSUMPTION

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EKONOMICKÁ ANALÝZA ZDRAVOTNÍCH ASPEKTŮ KONZUMACE MLÉKA

Summary:

The bachelor thesis is divided into two major parts, the theoretical Literature review and the practical Economic analysis of milk consumption. In the first part of the thesis, the health aspects of milk consumption are showed, described and explained. The demand for milk is justified and the milk consumption trend is presented.

In the second part of the thesis, different factors influencing the consumption of milk are analysed. This includes analysis of the relation between milk consumption and children numbers, price of milk and price of its substitute and its complement. Milk consumption function is invented and stated in this part showing these correlations. Health aspect of the rate of fractures and its causality by milk consumption is analysed here as well. All of the findings from the analysis are then put together in a transition model which shows the effect of the identified variables on each other. The results of the analysis are described, discussed and evaluated.

Souhrn:

Bakalářská práce je rozdělena do dvou hlavních částí, teoretické Literární rešerše a praktické Ekonomické analýzy konzumace mléka. V první části práce jsou popsány a vysvětleny zdravotní aspekty konzumace mléka. Také je zde odůvodněna poptávka po mléku a je zde představen trend konzumace mléka.

Ve druhé části práce jsou analyzovány různé faktory, které ovlivňují konzumaci mléka. Je vykonána analýza vztahu mezi konzumací mléka a počtem dětí, cenou mléka a cenou jeho substitutu a komplementu. Je vytvořena funkce konzumace mléka, která prokazuje zmíněné korelace. Ze zdravotních aspektů konzumace mléka, popsaných v teoretické části práce, byl k analýze vybrán počet zlomenin a jeho příčinnost konzumací mléka. Všechny poznatky nabyté v části analýzy jsou dále dosazeny do transitivního modelu, který ukazuje, jak jsou na sobě jednotlivé určené proměnné závislé. Výsledky analýzy jsou vysvětleny, projednány a vyhodnoceny.

Keywords:

Milk consumption, Milk, Dairy, Cow milk, Milk consumption externalities, Milk consumption function, Economic analysis, Health hazards of milk consumption

Klíčová slova:

Konzumace mléka, mléko, mléčné výrobky, kravské mléko, externality konzumace mléka, funkce konzumace mléka, ekonomická analýza, zdravotní rizika konzumace mléka

Table of contents

1. Introduction

It is generally known and regarded as a fact, that the consumption of milk is good for our health. Milk is one of the nutrition components of the majority of all the people on earth every day, especially in Europe and North America. Milk is one of the most usual ingredients found in our homes in this part of the world. It is white coloured liquid that comes from the mammary glands of mammals and is commonly perceived like an important source of vitamins, minerals and proteins intake for the body (not only human body, but also other mammals that drink it). When baby mammals are born, milk is the only source of nutrients that they get before they start to feed as adults. The only exceptions in this natural process of stopping drinking milk are humans. Here in Europe, people mainly consume milk that comes from cattle (cow milk), goats or sheep. Milk exists in people´s nutrition for several centuries; since people domesticated the mentioned animals, they started to use their milk. Long time before today´s generation was born, cattle was smaller and did provide only a fraction of milk it provides today. Now, due to the evolution and progress in the fields of industry and science, cows are larger and their milk production was maximized, so that it satisfies the demand for milk in nowadays society.

Due to the relatively unchanging level of milk consumption on the world, milk market is one of the most stable markets in the field of agriculture. Cow milk is favoured for its supposed benefits on human health. As mentioned above, milk is presented in everyday's life of the majority of the people in the world. People drink it in coffee, eat it with cornflakes etc. For the vast number of citizens in North America and Europe, milk is an indispensable element in their diet. It is very hard for these consumers to consider a possibility that such an ingredient is harmful somehow. However, in the last couple of years, more and more news and findings have arose saying, that milk is not as beneficial as the majority of people thinks. Sometimes, such a statement contradicting all society´s up to know knowledge appears and it is unique, the person who proclaims that is said to be a maniac, a member of a sect, or other things that should discredit him from getting credibility in front of other people. But this is not this case. Before, these information were not seen as important, because they were few and no one put big emphasis on them

thinking that, if everyone likes milk, the statements about its benefits cannot be wrong. But as the time went on, this kind of information become more common. On top of that, since the first reference of thought that milk intake is hazardous for our health, quite a number of studies was done and surprisingly for the society of Europe and Northern America, they confirmed the pessimistic scenarios. Many scientific books and researches were published on this topic. They all agree in one thing: Cow milk should not be consumed by human.

It is a wonder why still no one knows about the "dark side of milk". Or is it that no one "wants to know" about it? It takes time from the instance when scientist come to a conclusion, the conclusion comes into the awareness of people and the awareness comes into practice. When a first notion about cigarettes being unhealthy appeared, society also opposed it for a long period of time. But now, after several decades, cigarettes are subjects to a very strict laws and each box has to show "cigarettes harm" notice on it. Of course, such theories like this one about milk being harmful are not easy to adopt by the society. And they shouldn´t be. There is still a need to conduct scientific studies, to do empirical research and to back up the theory more by that. But one thing that should not be done is to overlook these theories, because they are not few anymore. It is, at least, discussable, why such a contradictory foodstuff is so highly demanded and even subsidised.

It is required to create a better picture about these theories in the wider public, and to put the cognisance together. Therefore selected scientific literature has to be studied and different phenomena described in it have to be explained. Basic questions, asking if and how the negative externalities of milk consumption harm people, should be asked and answered. Then, milk consumption can be analysed and conclusions can be drawn.

2. Aims and objectives

The aim of the literature review – the theoretical part of the thesis – is, to show, describe and explain the health aspects of milk consumption. Another objective of the literature review is to justify and interpret the demand of people for milk and the milk consumption trend. Furthermore, the image of milk in the society should be described. The objective of the theoretical part of the thesis is to present, that milk intake does not have only one – positive – side, but also that there are negative externalities that should be considered when, e.g. subsidising milk, or encouraging the society in its consumption. These may lead to an influence in the economy. The aim is to prove, that the general knowledge about the health hazards of milk consumption is poor.

The aim of the economic analysis – the practical part of the thesis – is, to demonstrate which factors influence the rate of milk consumption. A milk consumption function, including the coefficients, should be stated. Also, at least one of the health aspects, identified in the literature review, influenced by milk consumption, should be analysed. The analysis should follow the specific methods and procedures under mentioned in the Methodology section of the thesis in order to find results and make conclusions.

At the end of the thesis, conclusions, evaluation and discussion of the methodology, procedures and results should be presented in the Conclusions section.

3. Methodology

In order to fulfil the goals, a number of qualitative and quantitative methods are used. Specifically, these include: regression analysis, correlation analysis, and time series trend analysis, graphical analysis including polynomial trend line analysis and questionnaire research. These methods and their usage in this thesis are described in more detail in the following section.

3.1. Collecting of theoretical background for the thesis

There was a need to create a theoretical background for the analysis. In order to fulfil the objectives of the literature review, scientific books, magazines and other sources of information were studied to learn especially about the harmful effects of milk consumption on human health. This was done because the general awareness about this concern is very weak. Usually, when talking about milk, people and scientists emphasize on its benefits. The general opinion about milk is, that is beneficial for human health and this is why this attitude is not given much space in the thesis. On the other hand, facts about the negative externalities were required, explored and explained.

Also, information was gathered about, why people consume milk and what are the general trends in milk consumption and milk subsidising in Europe.

3.2. Questionnaire research

At the beginning of the analysis, a questionnaire research was done to support or refute different assumptions and theoretical bases. The questionnaire was placed on Google documents and was distributed via internet. 115 participants inserted their answers to 5 following questions:

1)   *What age group are you in? (0-15, 16-25, 26-40, 41-50, 50 and more)*

2)   *Do you consume milk on regularly basis?*

3)   *Do you think milk consumption is beneficial for your health?*

4)   *What type of milk do you usually consume?*

5)   *If there is a substitute of milk in your diet, what is it?*

The questionnaire was passed along facebook, twitter and e-mail. Age distribution of participants was acceptable to draw credible conclusions. Each of the categories was represented by at least 11 people. The selection of the participants will be discussed in the Discussion chapter.

3.3. Graphical analysis

A graph for each variable studied in the analysis in order to see how the trend in the time series develops. Also, a polynomial trend line was created and its parameters presented in each of the graphs.

3.4. Milk consumption function

A milk consumption function was invented saying that:

Milk consumption QD =
= f (Price of Milk P + Price of Substitute Ps + Price of Complement Pc)

Milk consumption is a function of price of milk plus price of substitute (juices, lemonade and other non-alcoholic drinks) plus price of milk complement (coffee). Data was collected and analysed for all of these three variables firstly by an observation of graphical representation of the time series and then using the correlation coefficient and the coefficient of determination to see their correlation with the milk consumption time series. All of these sets of data were collected from year 1989 to nowadays. Finally, regression analysis was performed in order to find out the coefficients of this function.

3.5. Milk consumption – fracture rates; and children numbers

Other parameters and their relation to milk consumption were studied as well. These include: the influence of children (aged 0-14 years) numbers on the consumption of milk; and how the milk consumption influences the rate of fractures. The statistics of fractures were firstly analysed from the same period as the milk consumption, and then also for an earlier period, because there has to be a time lag between milk intake and its effects on the number of fractures (the structure of bones has to change). For the milk consumption, data from 1989 to 1998 were used; and for the fracture numbers, data from 2001 to 2010 were used. This part of the analysis is based on an assumption, that milk consumption influences the fracture rates through changing of calcium levels in the body, therefore changing the bone mineral density. The denser bones, the less fractures and vice versa. A simplification of the real world was done in this part, because, in the real world, it would not be so easy to define a single factor of sparser/denser bones and therefore higher/lower fracture numbers.

The data of children numbers and fracture rates were analysed by showing the time series graphs. To show their relationship with the milk consumption, the correlation and determination coefficients were calculated.

4. Literature review: Health aspects of milk consumption

4.1. Why do people consume milk?

Media show that milk drinking is the symbol of healthy growth and strong bones in the majority of Europe and North America. It can be seen also as a kind of mob psychosis. Everyone in the surrounding drinks milk and eats dairy products and everyone repeats what is said in the advertisements, like: "Milk provides nine essential nutrients your whole family needs!"[1] It is hard not to believe in these promises, because which foodstuff is so healthy and includes so many important and vital nutrients and in the same time is so good to taste? Which drink can be consumed with harmless amazing chocolate flavour and is so rich in vitamins and calcium in instance? Milk and dairy products are usually very good in taste, which is why so many people including children consume them. And that is not all. There are far more advantages of milk drinking, as was mentioned in the book "Pravda o mléce – jak ji potvrzuje věda" (translated into English as "Truth about Milk – As confirmed by science").[2]

Milk and milk products are relatively cheap to get and they are available everywhere. People do not have to travel far to get them as it was in the old times, when milk was accessible only to the farmers that got it straight from the cattle. It was not possible to carry it long distances, because milk rapidly degrades. Another advantage is that if a person drinks milk, he/she usually feels quite full afterwards. The proteins and fats from milk stay in the stomach for a longer period of time than carbohydrates. Human body metabolises milk for relatively long period of time, this is why it feels it is fed. This insight goes hand in hand with the fact that milk and dairy products do not have to be bitten as much as other foodstuffs, so they can be drunk/eaten in large amount quite quickly.[2]

After consuming something which includes milk, human body becomes calm and subdued physically and psychically as well. This is because the chemical processes during the digestion, especially because of the fat content of milk. Another factor why people consume milk that is link to its fat contents is the protection in low temperatures.[2]

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[1] Building strong families with milk, http://www.whymilk.com/building_strong_families.php, November 2011.
[2] Průchová Jarmila et al. Pravda o mléce – jak ji potvrzuje věda. Hradec Králové: SVÍTÁNÍ, 2003. ISBN 80-86198-43-X.

At last, but not least, milk is believed to contain loads of calcium. This is why the proportion of milk is proclaimed, for example, in each advertisement for chocolate. "Kinder Chocolate (Shokolade) was the first chocolate especially developed for children. The special in this chocolate are the extremely high creamy milk filling and the unique milky taste."[3] Calcium will make kids´ bones stronger while eating chocolate bars and drinking hot chocolate. Perception of milk and a sign for calcium goes hand in hand. Calcium became the driving force in increasing demand for milk. This phenomenon is visible all around. This is why this issue will be given adequate attention further in the literature review.

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[3] Kinder Chocolate: About, http://www.kinder-chocolate.com/kinder-chocolate.html, November 2011.

4.2. Subsidising of milk

It was already mentioned, that milk and dairy products are cheap to afford. On top of that, there are many subsidising programmes lead by the milk producers, by the governments of the countries or even by larger bodies, i.e. the European Union. One example of such a subsidising programme is the EU's School Milk Programme. "The European Union's School Milk Programme isn't just about milk. It's about milk, yogurt, cheese, buttermilk and other delicious milk products that are important to good nutrition and a balanced diet. It's also about you and your well-being: eating well, staying fit and being healthy. Packed with calcium, vitamins, minerals and other nutrients your body needs ... The European School Milk Programme supports good nutrition and a healthy, balanced diet for pupils through subsidies and education."[4] In good faith, this programme distributes approximately 300 000 tonnes of milk per year in the 27 member states and gives more than 55 million EUR subsidising for it. To support its action, this programme proclaims all the known general benefits of drinking milk as the desirable calcium and vitamin contents, it calls it the nutritional "power" of milk.[4]

4.3. Negative externalities of milk consumption

From the literature studied, it came out, that there are a few points to consider. The preceding part of the literature review shows clearly, that the knowledge about the negative externalities of milk consumption is rather poor. In the following sections, the most important scientific cognisance, papers and studies concerning the negative externalities and health hazards of milk consumption are mentioned, discussed and described.

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[4] Milk Power! The School Milk Programme, http://ec.europa.eu/agriculture/drinkitup/index_en.htm, November 2011.

4.3.1. "The China Study"

One of the most important empirical evidences about milk being harmful for human health arose from a study initiated by Dr. T. Colin Campbell and Dr. Chen Junshi. Here below is a summary of the information about the research and its results.

Dr. T. Colin Campbell is one of the most respected leading biochemist, who deals with how our diet affects our health. During 1970s and 1980s, he was the leader of a group of 15 scientists to conduct a study called "The China-Cornell-Oxford Project" in China. This enormous project included more than 8000 participants. Each of them was asked 367 items about his/her nutrition, health and life style. This is the most extensive, largest and longest study that was ever done in the research of how the nutrition influences health. In China, the vast majority of people lives in a certain country (provenance) and does not move all lifelong. Also, the people there eat food from their surroundings. They eat what is grown there. Campbell and his team studied how the geographical differences change the diet composition factors and how the diet composition affects the health conditions of the people.[5]

The findings of this study were that there is 30 – 40% less chance of having cancer, if we exclude animal products from our diet. This means meat, milk etc. Risk of some forms of cancer can be diminished even by 90%. The more the diet of the participants was based on the plant products, the healthier they were (cancer, diabetes, lung and heart diseases). Animal foods like meat or milk are typically eaten by people from the western world (Europe, North America) and some parts of China. This kind of food cause that women grow quickly, quicker than the rest of Chinese women whose diet is based on plant products. Oestrogen release starts earlier, than it should, because the body is precocious. Then, they get the menstruation earlier and menopause later. This means, that the time of oestrogen activity is longer and so this increases the chance of having breast cancer in the western women oppose to the Chinese ones.[6]

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[5] The China-Cornell-Oxford Project Results, http://web.archive.org/web/20090307165623/http://nutrition.cornell.edu/CHINAPROJECT/results.html, November 2011.
[6] The China-Cornell-Oxford Project Results, http://web.archive.org/web/20090307165623/http://nutrition.cornell.edu/CHINAPROJECT/results.html, November 2011.
Průchová Jarmila et al. Pravda o mléce – jak ji potvrzuje věda. Hradec Králové: SVÍTÁNÍ, 2003. ISBN 80-86198-43-X.

4.3.2. Michio Kushi

A major sympathizer with the "milk has negative effects on people" attitude is Michio Kushi.

Michio Kushi is well-known expert in traditional nutrition systems of the Far East. "In the 1980s, Michio Kushi met with government and social leaders at the United Nations, the World Health Organization, UNESCO, the White House, and in many foreign countries. His seminars and lectures on the relation of diet and degenerative disease and the reconstruction of modern humanity have attracted thousands of doctors, nurses, nutritionists, and other health care professionals."[7] In his interview for the East-West Journal that was published in July 1980 he talked about the effect of milk and dairy product consumption on human body. In short, he described, that cow milk contains proteins, fats and many other nutritious components, which are similar to those contained in the human breast milk. However, the cow protein and fat molecules are very different to those human ones. This applies when talking about their abundance, their size or even their effects. Molecules contained in cow milk are much larger, because cows are also larger than human beings. People who drink milk are also bigger; some of their organs are more "diluted" (such as liver, intestines, brain...). This means no good. Compare people living in Asia and in Europe or North America. Their size and body structure is very different; this is caused just by their nutrition. Michio Kushi says that people drinking milk are emotionally, physically and mentally slower, less active, dumber and less sensitive. By this way, he explains why the West colonized the East. People in the West become bigger and stronger; they tried to solve every conflict by war. In the same time, people in the East developed spiritual qualities that Westerns can only dream of. "Dairy food eaters. This is the race of fools. Dairy products are food for cows, and man's mentality becomes cow-like eating them. As a cow, this sort of man is fine; as a man, he has less sensibility than he could."[8]

For the decades, that Michio Kushi studied the influence of nutrition on human health, he came to a conclusion, that milk most harms breasts, uterus, ovaries and prostate. The reason is that milk is the product of cow mammary glands, so it attacks the glands that are

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[7] Michio Kushi Biography, http://www.michiokushi.org/bio.php, 2011.
[8] Kushi Michio. The Teachings of Michio Kushi. Becket, Massachusetts: ONE PEACEFUL WORLD PRESS, 1993. ISBN 0-9628528-9-9.

the most similar, that have similar structure. Milk causes phlegm of the human body. Phlegm and fat surrounds the attacked organs at first, than cysts fibroids and tumours start to create and finally cancer occurs. But milk does not harm only these. It also affects the function of thyroid gland, nasal cavity, pituitary gland, ear, bronchial tubes, and the area around the midbrain and so can be continued. Kushi says that up to 80% of all diseases can be linked to milk consumption. These include: cancer, tumours, cysts, and skin diseases, allergies, hearing problems, stones, respiratory problems, hay fever, mental illness, sexual problems, infertility, arthritis and rheumatism. The abundance of all of these serious problems is increasing proportionally to the increasing milk consumption.[9]

Cow milk is described as the substitute for human breast milk to which people became addictive after the breast feeding from their mothers terminated. People do not want to give up drinking milk in the same manner they did not want to give up the breast feeding. This comes to a result that people do not want to see the harmfulness of milk, they cannot accept it. They are emotionally used to drink milk, so there is a psychological and physiological factor in this as well. This practice is repeated for generations now, in USA it came to a point, that people become allergic to wheat. They became allergic to the main nutrition component of their ancestors. This built allergy appeared, because of milk consumption. People do not want to eat macrobiotic food; they do not want to give up drinking milk. According to Michio Kushi, statements saying that milk is perfect and autarchic food absolutely neglect all really important and basic scientific cognisances. As the difference between human and cow body cells, their size and their quality, for example.[10]

[9] Kushi Institute of Europe – Dairy Food,
http://www.macrobiotics.nl/encyclopedia/encyclopedia_d.html#dairy, November 2011.
[10] Průchová Jarmila et al. Pravda o mléce – jak ji potvrzuje věda. Hradec Králové: SVÍTÁNÍ, 2003. ISBN 80-86198-43-X.

4.3.3. Further scientific evidence of milk consumption´s negative externalities

Why people should not drink milk? What does it harm and how?

Among further literature studied, these papers, studies and thoughts were found to be the most significant sources and therefore the main findings from them are presented below.

William Ellis is a doctor, who studied the effects of milk consumption on thousands of his patients and came to interesting conclusions. He did disprove that milk is a source of calcium for our body. In the Healthview magazine 14/1978, Ellis is talking about the harmfulness of milk. In his opinion, milk is not good food for adults, nor for kids. Ellis describes similar problems as Kushi and Campbell that arise from milk consumption. Milk and dairy products are not easily absorbed and metabolized by human body. This leads to digestion difficulties and problems with absorption of other substances. The reason for it is that cow milk neutralizes hydrochloric acid which affect the function of stomach and glands that make it. Also, the mucus, that is formed after milk is consumed, stays in the intestines and lungs. This makes the surface of those organs non-permeable and stops the absorption of all substances that the body intakes. This leads to chronic fatigue. "As for drinking milk for calcium, Dr. Ellis states that after doing blood tests on more than twenty-five thousand people, he found that those who drink three, four, or five glasses of milk a day had the lowest level of blood calcium. ... What's the main effect of milk on the body? It becomes a clogging, mucus-forming mass that hardens and sticks to everything inside the small intestine, making the body´s job that much more difficult."[11]

Kurt A. Oster made a research in 1960's and 1970's discovering, that heart diseases are caused by milk because it contains Xanthine Oxidase (XO) enzyme. XO changes/oxidizes plasmalogen (component arteries and heart tissue cells) and by that, it disturbs the structure of these tissues. XO enzyme attacks heart, when it enters the blood flow. In non-homogenized milk, human body excretes this enzyme as harmful substance. Chemical incidence of XO from cow milk scars the walls of arteries and heart tissue. Body

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[11] Robbins Anthony. <u>Unlimited power – a black choice.</u> New York: FIRESIDE, 1997. ISBN 0-684-82436-1.

reacts by settling fat on the injured places. This causes the level of cholesterol in blood to rise; fat fills the blood vessels and causes heart problems. [12] Harmfulness of XO enzyme is described also in works by Dr. K. Esselbacher, who supports ideas of Oster by saying that "Homogenized milk, because of its XO content, is one of the major causes of heart disease in the U.S."[13]

Frank Oski published a book called "Don´t Drink Your Milk". In this book, he put up some very interesting facts. Oski pointed out that people should not confuse human and cow milk. Kids, who drink cow milk more than 6 months, will have 1 or more allergies. Casein, which is contained in cow milk, is only needed for cows, not for human babies. In human body, casein is not digested, but is being absorbed into the blood flow. Then, it irritates tissues which are not exactly in the ideal state; they are more receptive to allergens. Liver have to get rid of casein, which makes unnecessary burden on it. Milk is seen as an ideal food, because people think that substances contained in it are automatically absorbed into the blood. However, cow and human milk are two different liquids that should satisfy biological and metabolic needs for two very different organisms. Calcium is not metabolized by human body if it comes from cow milk, but only from the human milk. Cow milk is for baby cows. Oski is also interested in the problematic of high milk consumption and its picture shown by the media. The advertising practices, political forces of the milk industry are the main causes of abnormally high milk consumption in USA.[14]

More humanistic explanation of why people should not drink milk is presented by Fredericka Milred. Again, she is putting emphasis on the pressure of milk industry that is put on society (especially in Europe and North America). She says that milk is food for the same species – that the kid, who drinks the milk and the mother producing it, should be the same species. Any other practice is dangerous from the long-time view. With cow milk, people grow faster, but non-proportionately. Human is the only animal, who continues to drink milk after the end of lactation period. Thymus is a gland that pre-digests milk in

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[12] Milk homogenization and heart disease, http://www.ichikung.com/pdf/MilkHomogenization.pdf, November 2011.
[13] Cow's Milk is the Perfect Food for Baby Calves, http://www.intensemuscle.com/archive/index.php/t-6441.html, November 2011.
[14] Oski Frank. Don´t Drink Your Milk. Brushton: TEACH SERVICES, 1996. ISBN 978-1-57258-628-4.

babies. Then, in approximately 2 years of age, the gland become smaller and its function changes, according to the natural laws, it is not needed anymore as the lactation period finishes. However, as people continue drinking milk, nothing pre-digests it. It comes straight to the stomach and it is absolutely unprepared for the digestion process. This leads to chronic snifters and coughs in children and even to damages of thyroid. By pasteurising, casein in cow milk is concentrated to 300%, this leads to even more difficulties.[15]

In 1980, East West Journal published an article in which **Bob Allenson** talks about milk as the liquid that should nourish the young ones until they double their size, until they develop teeth and until they start to eat their natural food. Milk of each animal is different. It contains casein and lactose, but in different proportions. Extra dose of casein in the cow milk settles in human stomach and creates ballast. Lactase is enzyme digesting lactose; it is made only to 2 years of age of human kid. Proteins and calcium, which are multiple times more abundant in cow milk, are used to build up large body and skeleton. On the other hand, carbohydrates are needed for brain development that is why they are 1.5 times more abundant in human milk.[15]

Alexander G. Schauss says that "'Excessive milk consumption is connected with juvenile delinquency. Researchers at the University of Washington found that male offenders consumed an average of 64 ounces of milk a day, while the control group, and rank an average of 30 ounces."[16] in his book called "Diet, Crime and Delinquency". In his study he compared the control group, who did not commit any crime with delinquents. He found out that there exists a link between over consumption of vitamin D, calcium and phosphorus (milk) and decreasing level of magnesium and increasing level of lead in the body. As magnesium levels decrease, the development of nervous system is disturbed. Therefore it leads to violence and delinquency.[16]

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[15] Průchová Jarmila et al. <u>Pravda o mléce – jak ji potvrzuje věda</u>. Hradec Králové: SVÍTÁNÍ, 2003. ISBN 80-86198-43-X.
[16] Schauss A. <u>Diet, Crime and Delinquency.</u> Berkeley: PARKER HOUSE, 1980.

A theory that was firstly published in the Journal of Clinical Nutrition 61/6 Suppl. in year 1995, reads: "Epidemiologic studies have not provided evidence that high dairy product consumption by adults prevents fractures; in fact, the results of several studies suggest positive associations."[17] Collin Campbell than supplements that according to his study, there is nearly no milk present in the China rural areas and there is significantly lower level of fractures (osteoporosis). On the contrary, milk causes diabetes, lack of iron and slight bleeding of digestive tract in children, dermatitis and risk of lung and lymphatic system cancer. Risk of non-Hodgkin lymphoma is higher by 80-90% by the milk consumption. And even soy or goat milk (which are said to be "cleaner") are not better.[18]

Study published in New England Journal of Medicine approves, that there is a link between milk consumption and childhood diabetes. Child body mistakenly intakes certain protein from cow milk, which is similar to human protein which co-produces insulin on the pancreas. The Antibodies made by the human immune system then, in the first 10 years of life, damage 90% of beta-cells, which should make insulin. And these cells are damaged forever.[19]

Dr. Thiery Brun is describing further the idea about milk stopping the calcium intake. For Das Grosse Leben 23/92, he said that large amounts of proteins, that are present in cow milk lead to over excretion of calcium. Body has to excrete more calcium than it actually intakes. The deficit of calcium is than supplied from the reserves – the bones. Therefore they become more fragile.[20]

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[17] Health implications of Mediterranean diets in light of contemporary knowledge. 1. Plant foods and dairy products, http://www.ajcn.org/content/61/6/1407S.short, November 2011.
[18] The China-Cornell-Oxford Project Results, http://web.archive.org/web/20090307165623/http://nutrition.cornell.edu/CHINAPROJECT/results.html, November 2011.
[19] Diabetes and the Environment – Wheat and Diary, http://www.diabetesandenvironment.org/home/other/diet/wheat-dairy, November 2011.
[20] Průchová Jarmila et al. Pravda o mléce – jak ji potvrzuje věda. Hradec Králové: SVÍTÁNÍ, 2003. ISBN 80-86198-43-X.

To conclude this part of the literature review, all the illnesses and health difficulties that are possibly caused or co-caused by milk consumption and were mentioned above should be listed. These include:

Cancer, tumours, cysts, and skin diseases, diabetes, lung and heart diseases, allergies, hearing problems, stones, respiratory problems, hay fever, mental illness, sexual problems, infertility, arthritis and rheumatism, chronic snifters and coughs in children and even to damages of thyroid. Also, there are studies that proof that milk consumption increases the osteoporosis and fracture levels, while it decreases the calcium uptake by human body.
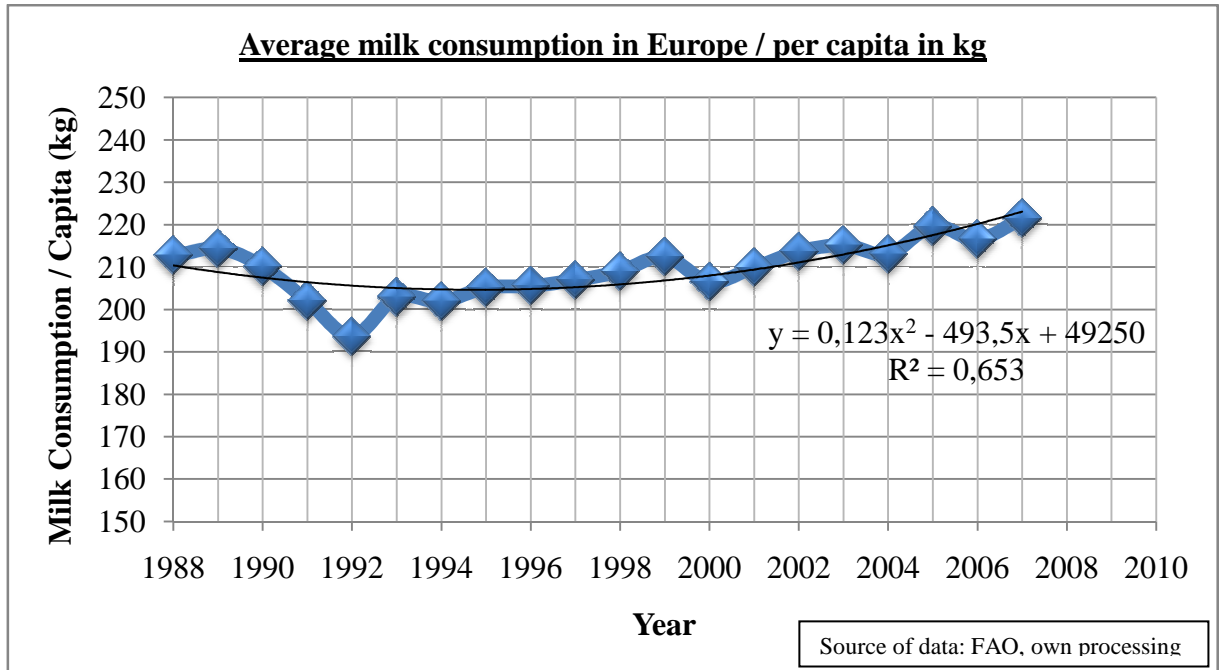
On top of that, it was confirmed, that people drinking milk are emotionally, physically and mentally slower, less active, dumber, less sensitive and furthermore, that milk consumption causes juvenile violence and delinquency.

Clearly there are two extreme views when looking on the milk consumption. Both of them are supported by empirical studies and both of them have a queue of scientists and supporters behind them. The problem is that these two theories are absolutely incompatible with each other. The negative externalities of milk consumption are described in detail in the above section saying, that this attitude cannot be taken lightly. Now, after knowing all about the hazards of milk drinking, it is questionable why the consumption of milk is so high is across the world, Europe, or even more precisely, in the Czech Republic.

4.4. Milk consumption overview

The graph bellow shows the milk consumption across Europe in kg per year, per capita.

Average milk consumption in Europe / per capita in kg

$$y = 0{,}123x^2 - 493{,}5x + 49250$$
$$R^2 = 0{,}653$$

Source of data: FAO, own processing

Graph 1: Average milk consumption in Europe/per capita in kg

The level of milk consumption is relatively stable across Europe. In average, the amount of kg of milk consumed in Europe per year per capita between 1987 and 2007 is around 210 kg. It is one of the most common foods we intake, it is cheap and so, no economical factors affect its consumption. There is only one drop in the curve, and that is in year 1992. According to "Commodity review and outlook 1992-93" book, this was because the feeding grain price increased and cow numbers decreased. In the world measure, the milk consumption increased even back then, but in Europe the former USSR states caused the decrease. "In the former USSR, milk consumption dropped by 8 percent during 1991 and was estimated to have fallen further in 1992. Output was affected by continued herd reduction, poor pasture conditions and a shortage of winter feed."[21]

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[21] Food and Agriculture Organization of the United Nations. Commodity review and outlook 1992-93. Rome: FAO, 1993. ISBN: 92-5-203296-1.

If the milk consumption is continuously so high across Europe, and there is even a number of subsidising programmes supporting it, e.g. School Milk programme by the EU, which was already mentioned, there is a need to analyse this phenomenon in order to see, if milk is unambiguously good. To find out what factors influence the milk consumption level and also, what factors are influenced by the milk consumption. If variables that affect milk consumption are found, then milk consumption can be manipulated. And if even a single variable, concerning human health, is identified that is affected by the milk consumption, the correlation should be studied in order to see if the effect of milk on human health is beneficial or harmful.

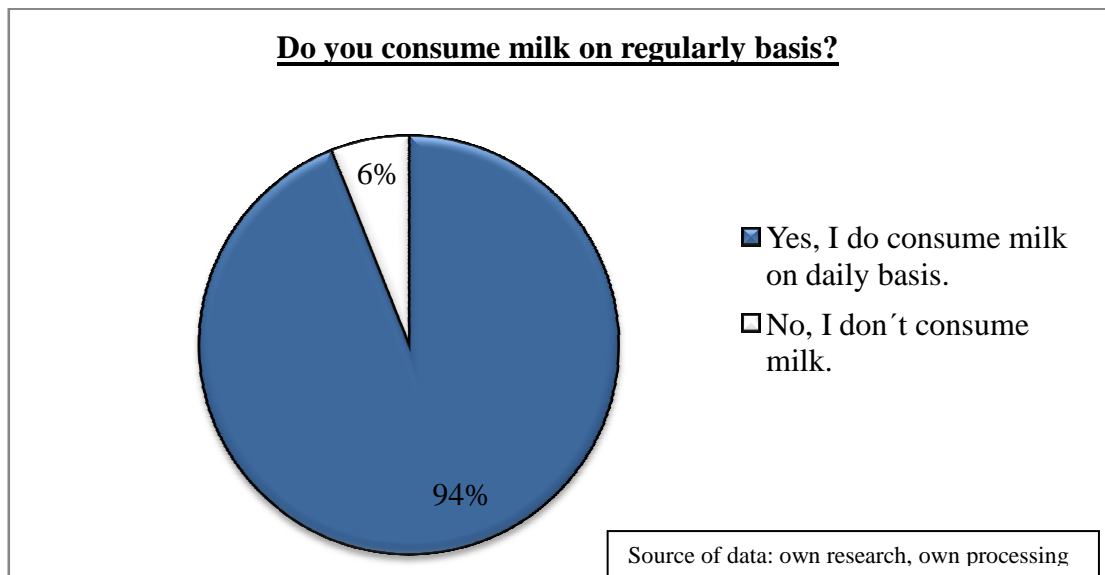# 5. Economic analysis of milk consumption

According to the methods and procedures described in the Methodology section of the thesis, an analysis was performed. Methods of questionnaire research, regression, correlation, determination, trend and graphical analysis were used to analyze the milk consumption in the Czech Republic. Then, the results from these assessments were used to find out the influence of milk consumption onto human health. At the end, by the transition model, this gives an equation saying that there are

- factors that influence milk consumption,
- milk consumption that influence health,
- and therefore, the factors influencing milk consumption influence health.

5.1. Results of the questionnaire research

A questionnaire research was made to find out answers to basic questions that came up after the theoretical analysis of the problem. The answers to the questions and the descriptions follow:
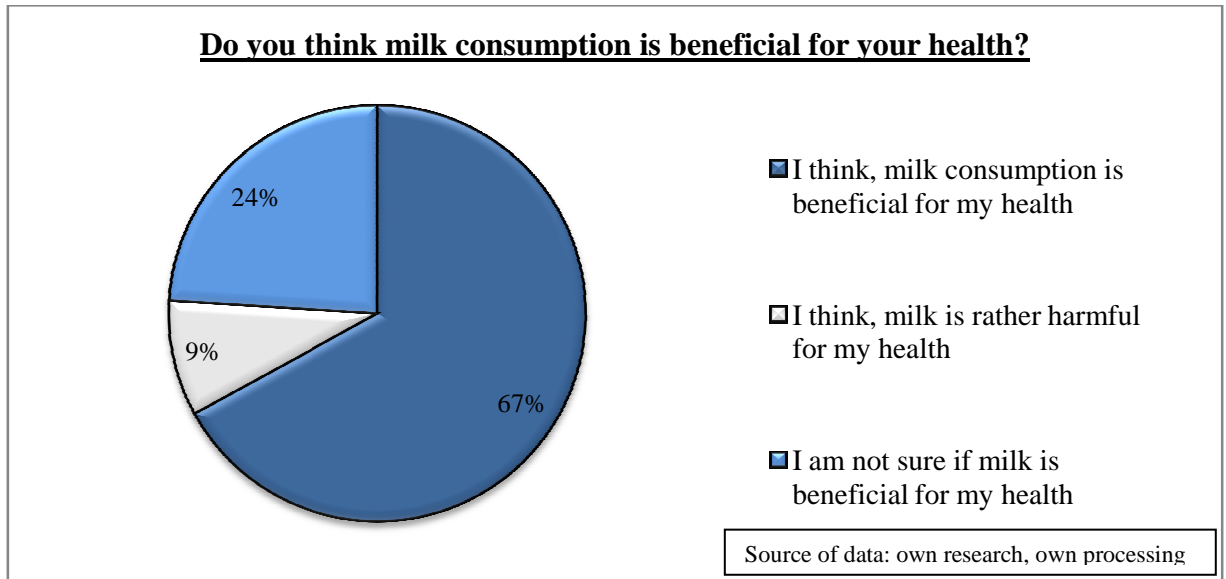
1) *What fraction of people does consume milk on regularly basis?*

Do you consume milk on regularly basis?

6%

☑Yes, I do consume milk on daily basis.
☐No, I don´t consume milk.

94%

Source of data: own research, own processing

Graph 2/Pie chart: What fraction of people does consume milk on regularly basis?

94% of people admitted that they drink milk on regularly basis and only 6% of participants do not.

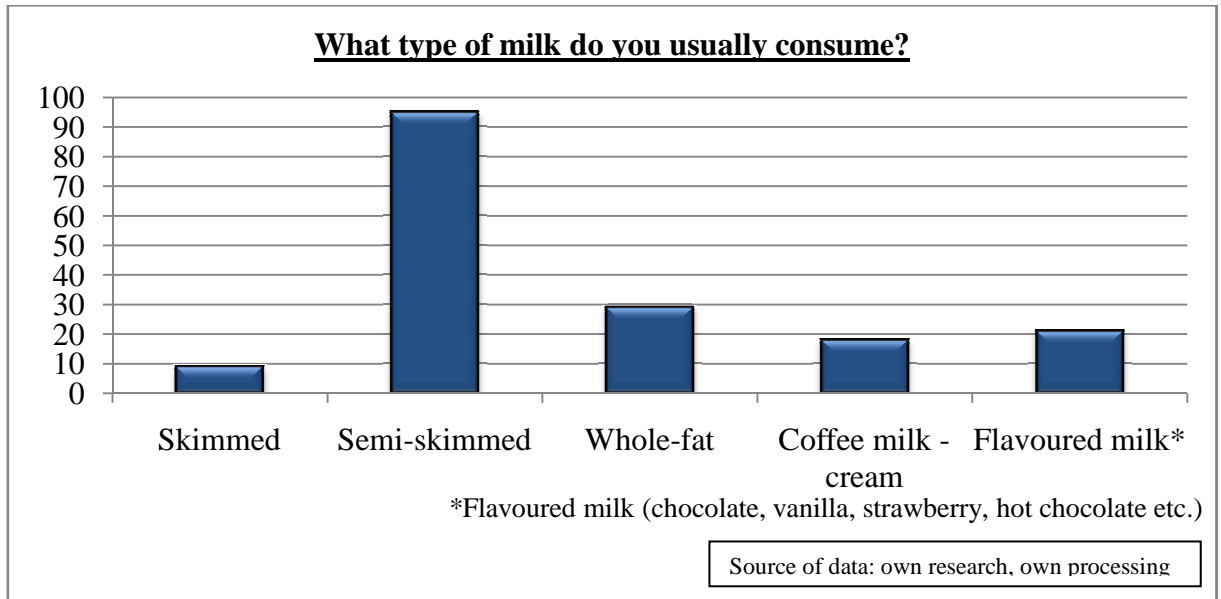## 2) *What is the general opinion of milk consumption in the society?*

Do you think milk consumption is beneficial for your health?

- 24%
- 9%
- 67%

- ■ I think, milk consumption is beneficial for my health
- □ I think, milk is rather harmful for my health
- ■ I am not sure if milk is beneficial for my health

Source of data: own research, own processing

Graph 3/Pie chart: What is the general opinion of milk consumption in the society?

The interesting conclusions that can be drawn from these two pie charts is, that even though 94% of people consume milk on daily basis, 24% says that they do not know if milk is beneficial for our body, and 9% thinks, that milk consumption is rather harmful for our health. This implies that, at least, 3% of questioned people drink milk even though they believe it is rather harmful to their body and at least 18% drinks milk even though they do not know about the consequences of milk intake. Why do people consume something they do not know its effects or they think it harms their body?

The pie chart of the answers to the second question also proofs, that the knowledge about the negative externalities of milk consumption is poor. Only 9% of asked participants think that milk is rather harmful for their health. This is only a small, deficient fraction of people.
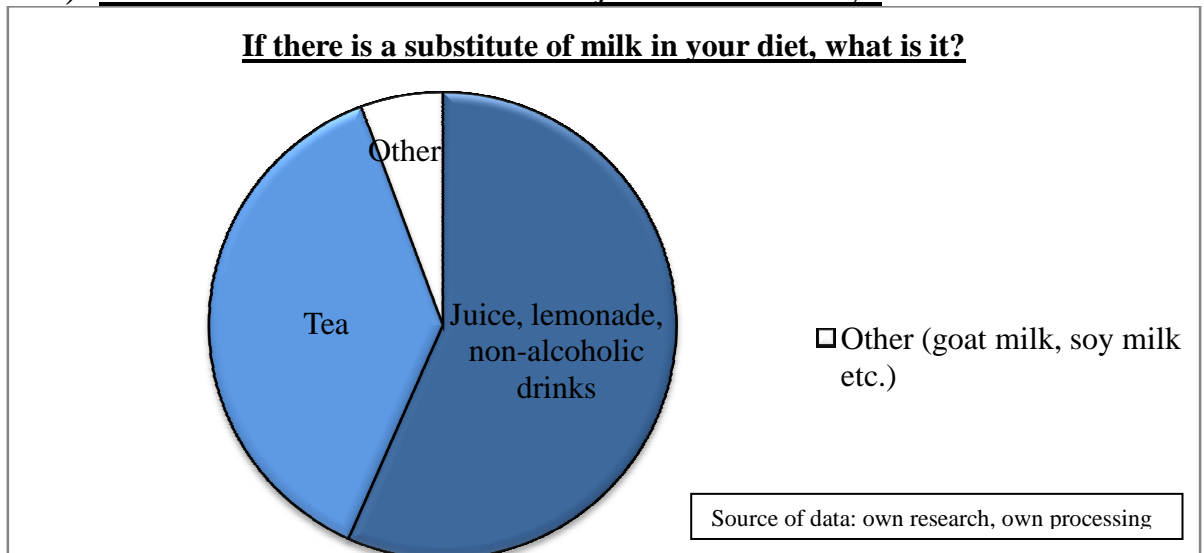
3) *What type of milk do people consume the most often?*

What type of milk do you usually consume?

*Flavoured milk (chocolate, vanilla, strawberry, hot chocolate etc.)

Source of data: own research, own processing

Graph 4: What type of milk do people consume the most often?

The vast majority of people consume mostly semi-skimmed milk; this is why the attention in further analysis will be focused on this type of milk.

4) *What is the most common substitute of milk in the society?*

If there is a substitute of milk in your diet, what is it?

□ Other (goat milk, soy milk etc.)

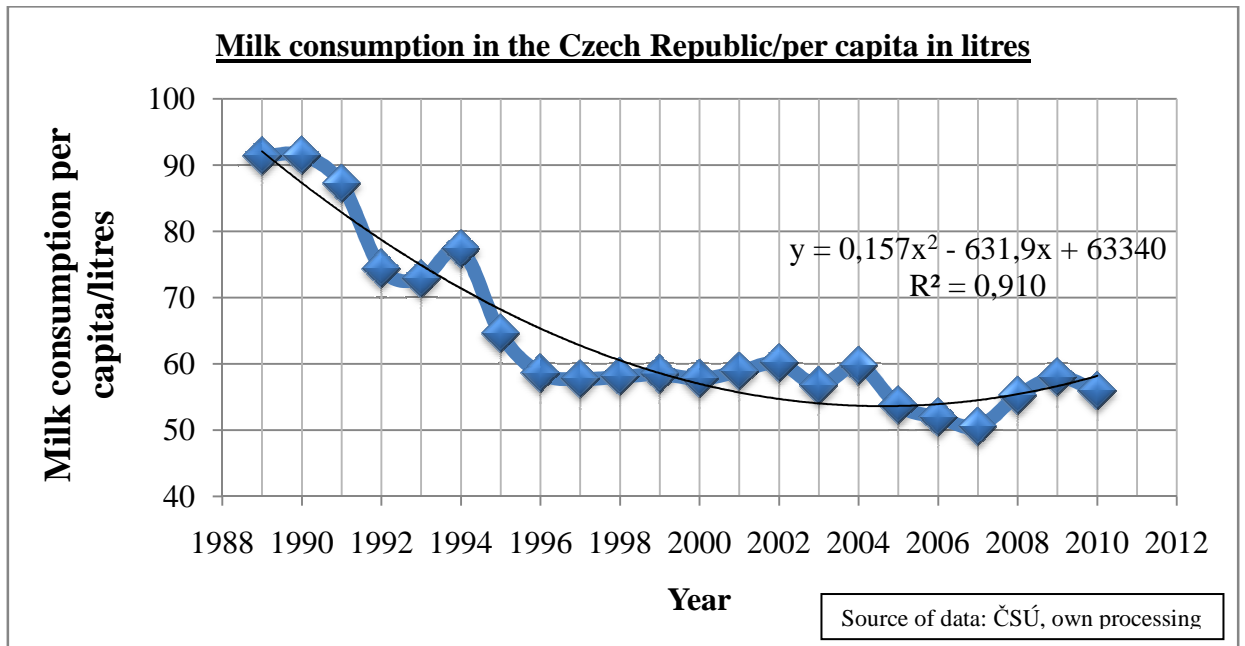Source of data: own research, own processing

Graph 5/Pie chart: What is the most common substitute of milk in the society?

There are two significantly important categories of potential substitutes for milk in the diet of people; these are "juices, lemonades, non-alcoholic drinks" and "tea". The first category that was the most abundant among the participants of the research will be also taken in account in further analysis.

5.2. Cow milk consumption in the Czech Republic and how it is influenced by children numbers

In the following graph, there is a time series of the milk consumption in the Czech Republic from year 1989 until nowadays. The milk consumption is measured per capita and in litres of milk.
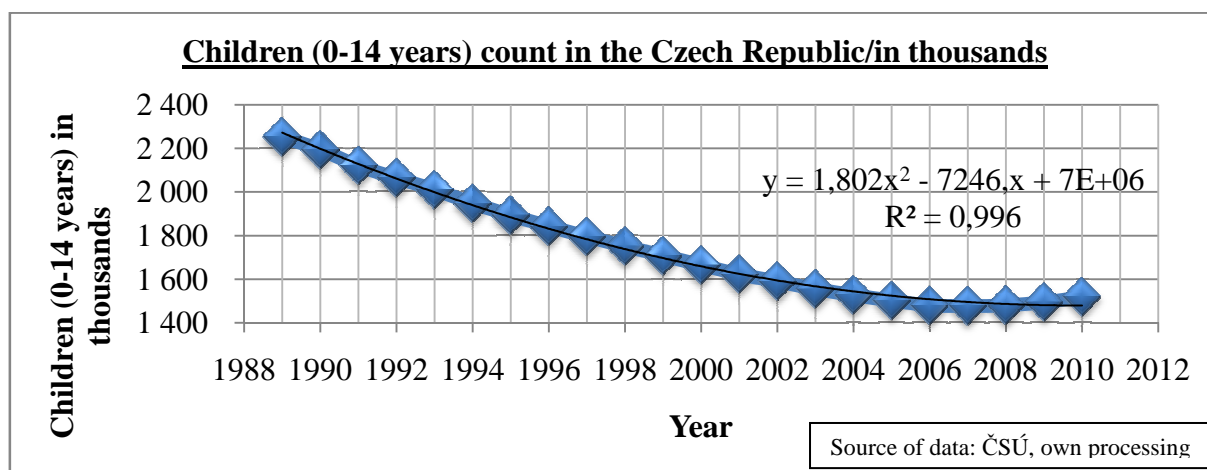
Milk consumption in the Czech Republic/per capita in litres

$$y = 0{,}157x^2 - 631{,}9x + 63340$$
$$R^2 = 0{,}910$$

Source of data: ČSÚ, own processing

Graph 6: Milk consumption in the Czech Republic/per capita in litres

There is a clear descending trend in the milk consumption in the Czech Republic from year 1989. This might be caused by several factors which are described further. The first sharp decrease in the milk consumption can be seen between years 1990 and 1993. After year 1989, there was a dramatic change on the Czech markets, change in imported/exported goods in particular. Suddenly, there was an extensive variety of products in the shops, that were imported from the former "western block" and now, they were accessible. This includes juices, lemonades and other products that were either not available, or their quality was very poor, before year 1990. According to the research, these types of drinks might substitute milk, e.g. instead of having a glass of milk during the breakfast, people have a glass of 100% orange juice.

Milk consumers are children, for the most part. In the Czech Republic, adults do not usually drink milk as such, e.g. instead of water, but children do. Children have a glass

of milk even several times per day. After mothers stop the lactation, they give warm milk to their kids. It seems natural for the mothers and for the children, to continue in milk consumption. It is also the easiest way to feed, it is quick and children can consume milk even before they develop teeth. There under is a graph of number of 0 to 14 years old children in the Czech Republic from 1989 to nowadays. After observing it, conclusions can be drawn about the relationship between milk consumption and the numbers of kids in the age of 0-14 years.

Children (0-14 years) count in the Czech Republic/in thousands

$$y = 1{,}802x^2 - 7246{,}x + 7E+06$$
$$R^2 = 0{,}996$$

Source of data: ČSÚ, own processing

Graph 7: Children (0-14 years) count in the Czech Republic/in thousands

The trend in the numbers of 0 to 14 years old children is descending as well as the milk consumption trend. However, opposite to the milk consumption trend, it is without any significant fluctuations.

The correlation coefficient "r" of the relationship between the milk consumption and numbers of 0 to 14 years old children in the Czech Republic between 1989 and 2012 is **0.919699119.** The maximum is 1, which means absolute dependence. 0.92 means, that there exists a very strong functional dependence between the two variables i.e. the milk consumption and children numbers.

The coefficient of determination "r^2" of the relationship between the milk consumption and numbers of 0 to 14 years old children in the Czech Republic between 1989 and 2012 is **0.845846469.** This represents the variance of milk consumption determined by the numbers of 0 to14 years' old kids. 84.6% of milk consumption is therefore determined by the kids' numbers, which is quite a lot. This leaves only about 15.4% to other factors influencing the milk consumption.

It is presumable that the milk consumption will change according to changes in children numbers. Milk is taken as a children-food. This is because it is the first nutrition they get when they are born. This assumption was also proved during the practice that was done in a restaurant. If a family with small children comes, they commonly ask a glass of milk as a drink for the kids.
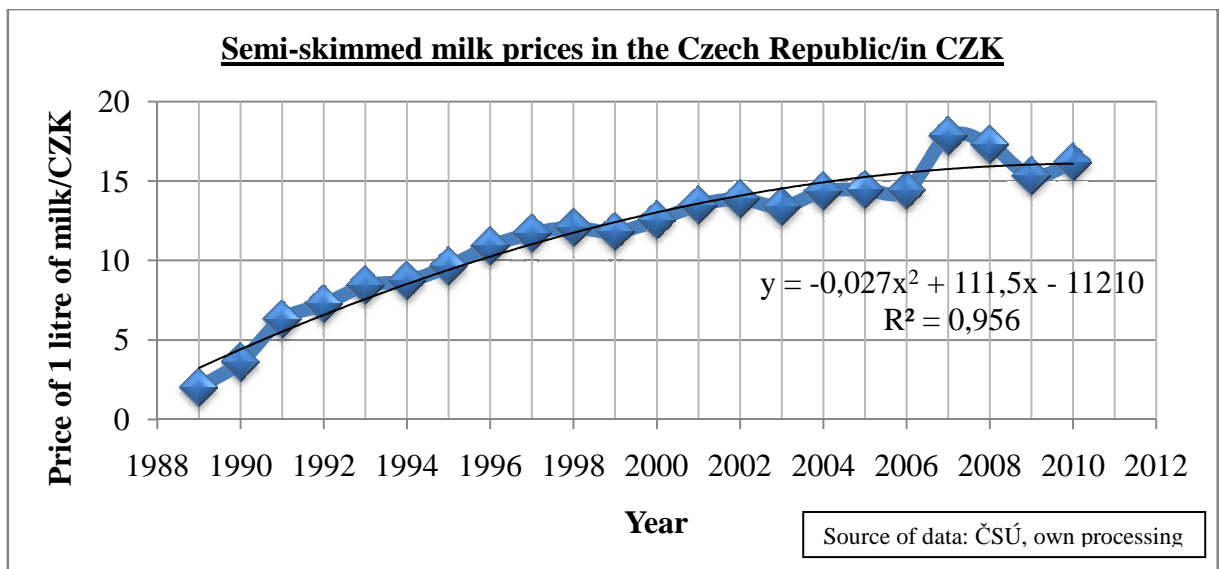
The assumptions were also confirmed further in the analysis, where the correlation between milk consumption and children numbers in the Czech Republic was interpreted and it had a very high coefficient ($r = 0.92$). Therefore a conclusion can be drawn that milk consumption is influenced by the number of children aged 0 to 14 years. Their numbers are decreasing, as it is usual in the developed countries. This means that, the milk consumption is decreasing as well. Maybe it is a question of time for milk to have some kind of "Milk harms" stickers, as cigarettes have. Certainly, mothers would not feed their children with milk anymore, or would reduce the amount of milk given to their children, at least.

5.3. Milk consumption function

A milk consumption function that considers different factors that can lead to changes in milk consumption was invented and created. This function will try to state the milk consumption using 3 different variables:

A: The price of milk (P), it is clear, that the price of milk influences the consumption of milk. As price increases, milk consumption decreases. As the semi-skimmed milk is the most favourable among people, the choice came to it while simplify the real world and make conclusions. Here under, there is a graph of semi-skimmed milk prices in the Czech Republic from year 1989 to 2010:
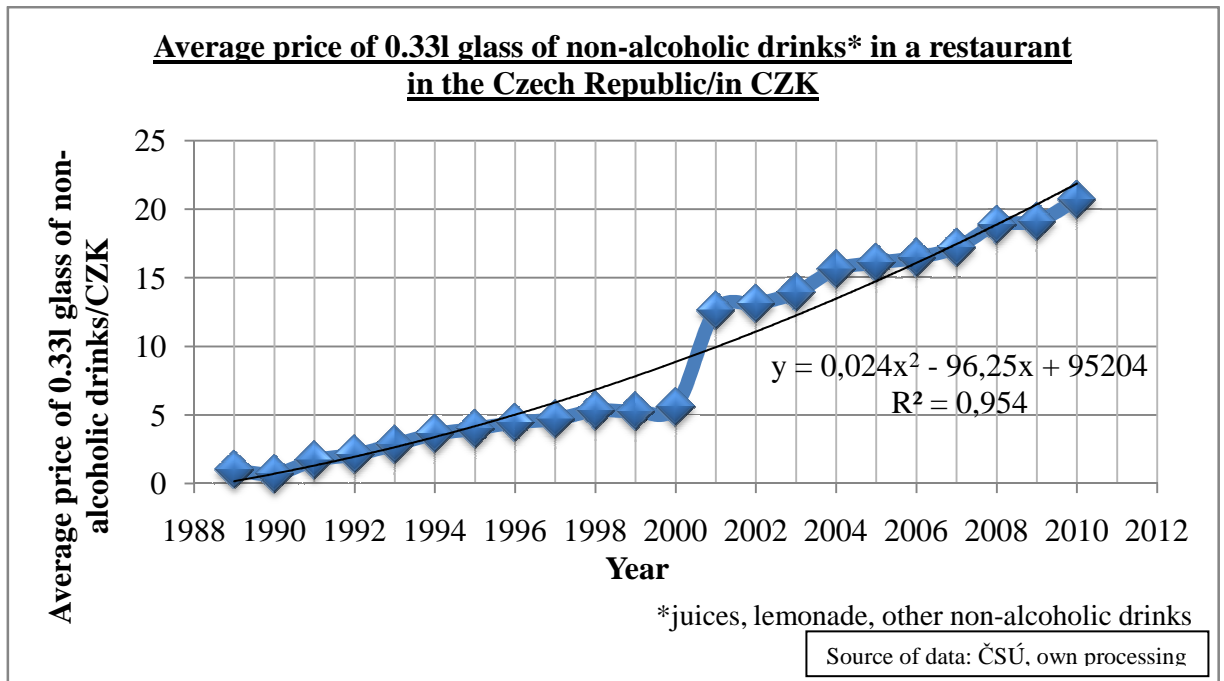
Semi-skimmed milk prices in the Czech Republic/in CZK

$$y = -0{,}027x^2 + 111{,}5x - 112210$$
$$R^2 = 0{,}956$$

Source of data: ČSÚ, own processing

Graph 8: Semi-skimmed milk prices in the Czech Republic/in CZK

The correlation coefficient "r" of how the milk consumption is affected by the milk prices is – **0.928822696.** This means, that there is a very strong functional dependence of the two variables, i.e. milk consumption and milk price, and the development of the two variables occurs in the opposite direction. This is clear from the graphs where milk consumption decreases during the period, while milk prices increase.

The coefficient of determination "r^2" of how much milk prices affect milk consumption is **0.862711601** which states, that the amount of milk consumption is affected by 86% by the milk prices. This leaves only 14% to other factors that could affect the milk consumption development.

B: Price of substitute – juice, lemonade and other non-alcoholic drinks (Ps). The two significant categories of substitutes of milk presented above were "juices, lemonade and other non-alcoholic drinks" and "tea". As the first category was more numerous, it will be used in this part of analysis. The graph of the juices, lemonade and other-non alcoholic drinks prices is here:


Average price of 0.33l glass of non-alcoholic drinks* in a restaurant in the Czech Republic/in CZK

$$y = 0,024x^2 - 96,25x + 95204$$
$$R^2 = 0,954$$

*juices, lemonade, other non-alcoholic drinks

Source of data: ČSÚ, own processing

Graph 9: Average price of 0.33l glass of non-alcoholic drinks in a restaurant in the Czech Republic/in CZK

The correlation coefficient "r" that shows how the price of substitute affects milk consumption is **– 0.720731869**. This is still quite high dependence between the two variables. There is an opposite development in the two sets of data. It means that, as the price of the substitute increased, the milk consumption decreased.

The coefficient of determination "r^2" says that 52% (**0.519454427**) of milk consumption is determined by the prices of its substitute.

However, the consumption of the substitute increased more than two times in last 20 years. Maybe it is because; people quit drinking milk and start to drink juices, for example, even if their prices increase. For an easier demonstration, there is a graph of juices, lemonade and other non-alcoholic drinks consumption in the Czech Republic from 1989 to 2010:
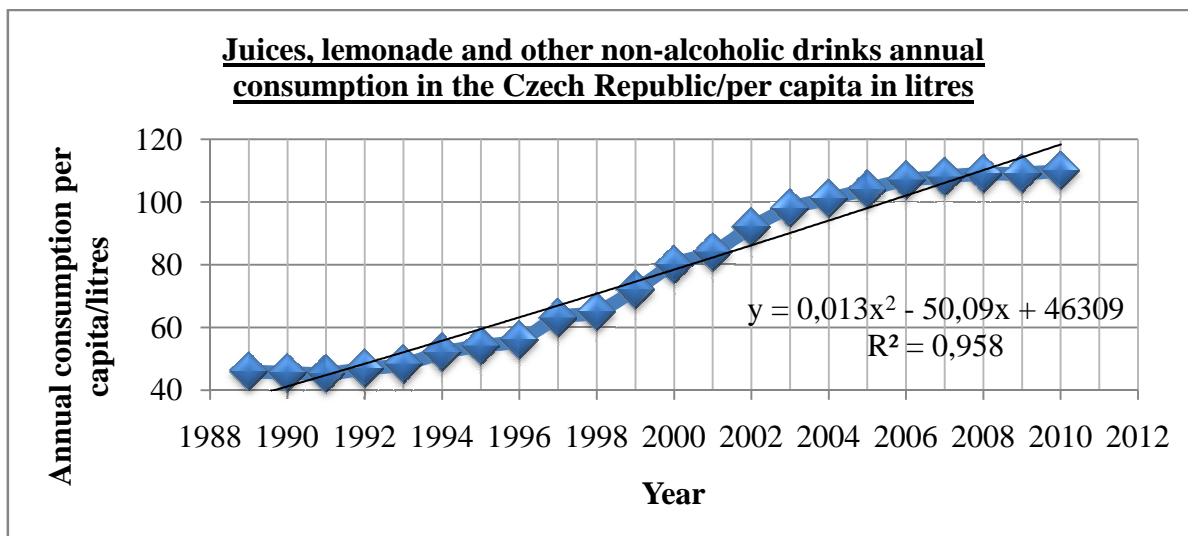
Graph 10: Juices, lemonade and other non-alcoholic drinks annual consumption in the Czech Republic/per capita in litres

C: Price of complement – coffee (Pc). Coffee is one of the most favourite complements of milk. Majority of people consumes coffee with milk. As the price of coffee increases the consumption of milk should decrease and vice versa. The graph of the coffee prices is below:
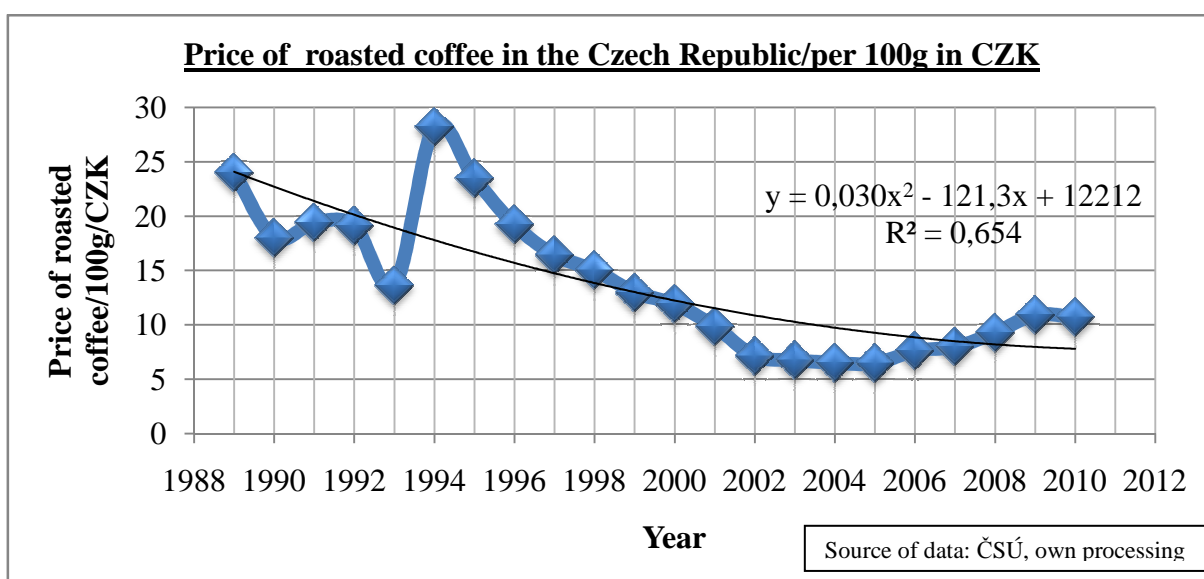
Graph 11: Price of roasted coffee in the Czech Republic/per 100g in CZK

Correlation coefficient "r" for this relationship between the price of component and the milk consumption is **0.701771377**, which shows comparatively high in-dependence of these two variables. The coefficient of determination "r^2" is **0.492483066**; therefore approximately 50% of milk consumption is related to the changes in the prices of coffee as its complement.

Milk consumption function – Multiple Regression

A multiple regression of **A, B and C** from above and their correlation with milk consumption, a regression equation, was established. The coefficient of correlation "r" in this multiple regression is equal to **0.943891085928934** which is quite high and it shows that REALLY these variables are in a strong relationship to the milk consumption. The coefficient of determination is **0.890930382096103**. This means that the milk consumption is influenced by these 3 factors by 89% which is a high percentage as well.

The equation of milk consumption will be in form of:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

The regression equation of milk consumption with the coefficients that were found looks like this:

Milk consumption QD =
= f (Price of Milk P + Price of Substitute Ps + Price of Complement Pc) + ε

QD = 100.23 – 4.23 (P) + 1.06 (Ps) + 0.25 (Pc) + ε

QD = 100.232475042074 – 4.23444835696001 (P) + 1.06417181093783 (Ps) + 0.24896467045871 (Pc) + ε

If the values for – P: Milk Price, Ps: Substitute Price (juices, lemonade...) and Pc: Complement Price (Coffee) – are substituted into the equation, the Milk Consumption value will be calculated for a given year. This number is very similar to the actual value of Milk Consumption that is known. This means that this equation can be used to predict, or find out missing values of Milk Consumption as well.

The milk consumption function studies the relationship between milk consumption, milk price, price of a substitute of milk and price of a complement of milk. As the substitute, juices, lemonade and other non-alcoholic drinks were used, because this was the most abundant answer to the question about milk substitutes in the questionnaire research. As the complement, coffee was used, because milk and coffee goes together hand in hand, there is no need to confirm this assumption in this research.

The regression analysis of these variables showed that there really exists a relation between them. This relationship is strong, with coefficient of correlation 0.94 and coefficient of determination 89%. The coefficients were calculated in excel and were presented precisely above. This founding was the biggest achievement of this thesis. The model of the equation was based upon assumptions of economic phenomena of customer behaviour, and it was proved in the analysis. This milk consumption function then can help us to predict milk consumption, or to find out missing piece of information of either of these variables included in the equation.
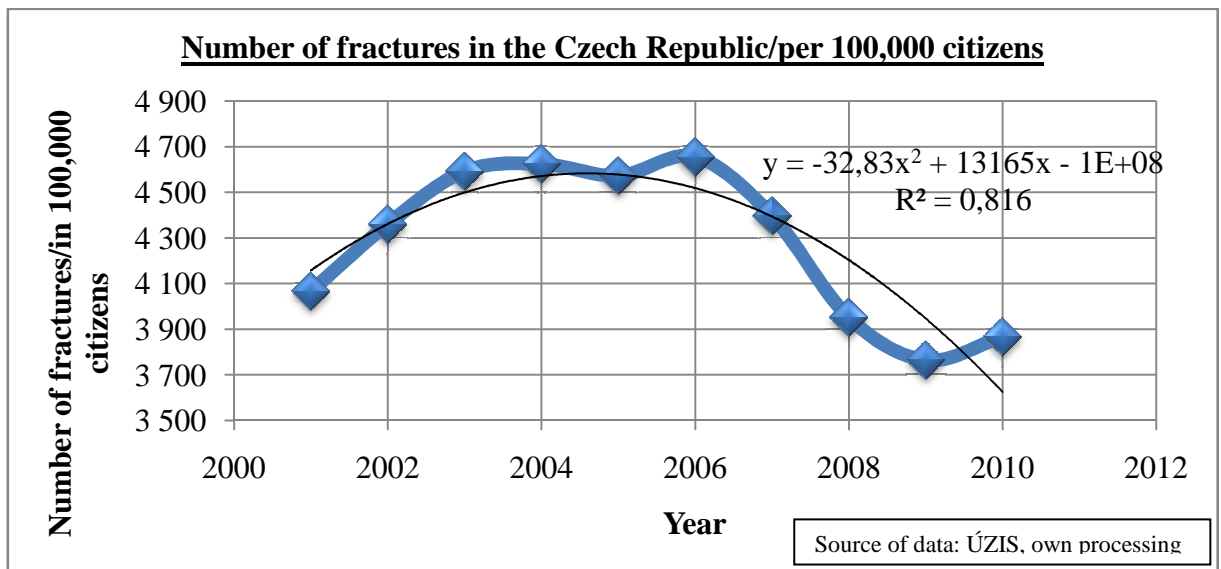
Also, the three factors influencing milk consumption were identified and proved. This means that if these factors are manipulated, the milk consumption is affected, because it is dependent upon them.

5.4. How milk consumption affects the rate of fractures in the Czech Republic

There are 2 major theories about health effects of milk consumption that were described in the introduction and the theoretical part of the thesis. In brief, one of them says that milk consumption is beneficial to our body and that the calcium included in milk is absorbed by the body and makes the bones stronger. Therefore, the rate of osteoporosis (illness of softer, sparser bones) and fractures should be lower, as the milk consumption increases and vice versa.

The second theory, on the other hand, states that calcium from cow milk is hardly absorbable and that the milk contents cannot be easily processed by human body. The process of decomposition of different substances from the milk in the digestive organs is so hard for the organism that it has to take elements (including calcium) from the reserves (bones). Also, the mucus, created by milk in the whole digestive system, sticks to the bones creating a non-permeable membrane which acts against the absorption of any nutrients. This causes softer bones and the rate of osteoporosis and fractures should increase.

The number of fractures in the Czech Republic for each 100,000 citizens for years 2001 to 2010 is below:

Number of fractures in the Czech Republic/per 100,000 citizens

$y = -32,83x^2 + 13165x - 1E+08$
$R^2 = 0,816$

Source of data: ÚZIS, own processing

Graph 12: Number of fractures in the Czech Republic/per 100,000 citizens

38

The coefficient of correlation of fractures and milk consumption in years 2001 to 2010 is – 0.23323329 and it shows a very weak independence. But there has to be some time lag in order to project milk consumption onto the health of citizens. Let compare and analyse milk consumption from 1989 to 1998 with number of fractures from 2001 to 2010. This correlation coefficient "r" equals to **0.52626473** which shows a medium strong dependence. So when milk consumption decreased in the 10 year period starting from 1989, the rate of fractures decreased in the 10 year period starting from 2001. The coefficient of determination "r^2" for this case is **0.276954566**, so the milk consumption affects abundance of fractures by approximately 28% according to this. And this also means that the higher the milk consumption the higher the fracture numbers which gives a proof to the second theory. Milk consumption is more harmful to our body, than beneficial.

There is a proof in the theoretical part of the thesis, that milk consumption is not certainly beneficial to human health. The analysis of the fracture numbers and the milk consumption in the Czech Republic supports this as well. Of course, that the milk consumption rate is not the only thing that causes softer, less dense bones (therefore, fractures). A simplification and elimination of other externalities was done to find out if some correlation exists here. Also, the estimated time lag of 12 years resulted from an assumption that there has to be a time lag between the actual intake of milk and its effects on bones, but more research has to be done in this field, to come to the precise period. The correlation shown above was small to moderate, however it is clear that these findings cannot be treated lightly.

If there is some correlation evident in a research like this, if more data and studies were done, they would find more accurate and empirical values for sure. This would mean serious implications. If there are high rates of fractures in the society, it is harder for the economy of a state to function properly. The government has to pay the patients the curing expenses; the sick benefits, because usually, patients with fractures cannot work. If the patients get osteoporosis, because their bones get less dense, they might even lose their jobs, or have other economical and psychological losses. These all count to the expenses of a state. Milk consumption might contribute to all of these outcomes.

6. Conclusions

Conclusions, discussion and evaluation

The results of the most part of the analysis were presented and evaluated right away, however, there is still a need to conclude and discuss the literature review, the research that was performed and the analysis and thesis as a whole. Also, the transition model presented in the beginning of the analysis should be evaluated.

Is milk beneficial to human health or not? Answer to the theoretical part of the thesis.

After studying many materials and literature, a conclusion came, that milk is not certainly that beneficial to human health as it is presented. However, even though there are many sources that prove the harmfulness of milk, there is still a need to make more, clear, empirical studies that would proof the assumptions. But even if there are only the mentioned studies and theories, it is not possible to overlook them. It is perspicuous, why the society and governments would do this. If the milk industry was restricted somehow, a large business would disappear.

As was mentioned, there are several subsidising programmes as School Milk that supports the milk business even more. These are worked-out programmes, which distribute money in order to reinforce supply of milk to children in order to bring healthy diet to them. However is milk really the right choice to fulfil the goal? Vegetables and wholemeal should be given to them instead. Milk contains many sugars and fats. It people intake too much of them, it leads to obesity. Obesity is a problem in North America and Europe. Places, where milk consumption is the highest. On top of that, it is not right to subsidise milk, if there exist questions about the negative externalities of its consumption.

As described in the theoretical background of this thesis, milk has many effects on human health. There are specific processes and illnesses influenced by milk consumption. A series of doctors and specialists explained them by empirical observations or studies, from which, the most important were cited, described and explained in the literature review. Off course, there is still a need to make more investigation in this field, but the answer to the question if milk is beneficial or not is, at least, worth a further thought.

The questionnaire research evaluation

A questionnaire research was done at the beginning of the practical part of the thesis. 115 participants were asked 5 questions, which were presented in the Methodology. The feedback of this research was needed to: see if people consume milk on general, and what do they think about milk consumption, to confirm that there exists a substitute of milk in human diet and to find out which kind of milk is mostly consumed among people. As long as cow milk plays such a basic role in everyday life of people, it is not a question of social class, gender, or other similar characteristics to consume it or not. It is cheap, affordable and easy to get. The only thing that the milk consumption might depend on is the age of the participants and that is why a question about age was asked in the research as well.

It came out, that most of the people drink milk regularly, and that only a small part of them is aware about its negative externalities. Also, it was found, that if milk has a substitute in the diet, it would be juices, lemonade or other non-alcoholic drinks. This means, for example, that instead of drinking a glass of milk during the day (breakfast), people may choose to have a glass of juice, lemonade or other non-alcoholic drinks. As the most commonly consumed kind of milk, the semi-skimmed milk was found. This is the reason why these were used in the further analysis (the milk consumption function).

Of course that a credible sample for an empirical research cannot be get through the internet. However, it is nearly impossible to obtain a random sample of the society. Even if the research is done in the field, i.e. in the streets, there is no evidence that the sample of participants will be random or predicative. But for this kind of research which is done on the given purposes, the sample is adequate to draw the needed conclusions.

The analysis and the transition model evaluation

Finally, there is a need to say, that the transition model, that was designed on the beginning of the analysis section could work. The three factors influencing milk consumption were defined (milk price, substitute and complement prices), and a variable, that is influenced by milk consumption was identified as well (fracture rates). This means, that the three factors can be manipulated in order to manipulate fracture rates, to prevent osteoporosis and to diminish government spending of the curing of it.

To give an example, in this thesis, it was found that milk consumption influences the fracture rates. Higher the milk consumption, higher the fracture rates. To diminish the fracture rates and the government spending on the medical treatment (and other costs related to the curing of fractures or osteoporosis), the government might, for example, raise the price of milk. Price of milk was identified as one of the three factors in the milk consumption equation that affects the milk consumption. Higher the price of milk, lower the consumption of milk. This implies that, according to this analysis, if a government wants to diminish its spending on medical treatment of fractures, it should increase the milk prices. This can be done by several measures, including cancelling of subsidies for milk.

Overall conclusions

To conclude the analysis findings and the fulfilment of the aims and objectives of the thesis, there is a need to say, that the goals were achieved. The health aspects of milk consumption were described and explained, the demand of milk was justified and the milk consumption trend was presented. Secondly, the assumption, that the general knowledge about negative externalities of milk consumption is poor, was proved in the questionnaire research.

The factors that influence milk consumption were identified and analysed according to the methods and procedures described in the Methodology section of the thesis. Variable influenced by the milk consumption was addressed as well and the correlation was studied. A milk consumption function was invented and the precise coefficients in it were calculated.

7. Bibliography, References and Resources

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Resources

Resources of data for the graphs:

Author´s own research

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Other resources:

Author´s own knowledge and experience.

8. List of graphs