

Charles University in Prague

Faculty of Social Sciences
Institute of Economic Studies



BACHELOR THESIS

**Measuring living standards with income
and expenditures in the Czech Republic:
how much does treatment of housing
costs matter?**

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Academic Year: 2012/2013

Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature. This thesis was not used to obtain another academic degree.

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Prague, July 28 , 2013

Signature

Acknowledgments

I am grateful to my supervisor, Petr Janský M.Sc., for his help and valuable advice during research and writing of this thesis.

Bibliographic record

Vach, D., 2013. *Measuring living standards with income and expenditures in the Czech Republic: how much does treatment of housing costs matter?*. Bachelor thesis. Charles University in Prague.

Character count: 120 879

Abstract

The topic of this thesis is income and expenditures inequality and poverty in the Czech Republic between 2006 and 2011. For this purpose, I used three concepts of income and expenditures. They vary in accounting for housing costs. The inequality and the poor household's group composition differs based on the chosen concept. The first concept accounts for consumption flow from housing derived from market rents paid in similar dwellings. This thesis examines this concept closely because it has been used on the Czech dataset for the first time. Next concept includes the real housing costs and the last concept deducts housing costs completely to compare living standards of households without distorting housing costs. Income and expenditures inequality and poverty are examined based on these concepts. The results show that the share of the poor in the population slightly increased in the monitored period and especially between 2010 and 2011. Inequality remained approximately the same for all income concepts but slightly rose for all concepts of expenditures. This fact proves the necessity of additional measure to income. As regards poverty, the most endangered is a household of lone parent with children, and children generally. Attention is paid to regulated rent tenure type and the deregulation process. I study the effect of the amendment which extended the deregulation process to 2012 in large towns. Among the others, many rich households kept gaining the benefits after the amendment as well.

Keywords	consumption, income, measuring living standards, inequality, poverty, consumption flow from housing, imputed income from housing, impact of rent control, rent control, regulated rent
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Abstrakt

Tato práce zkoumá příjmovou a výdajovou nerovnost a chudobu v České republice mezi lety 2006 a 2011. K tomuto účelu jsem použil tři koncepty, jak započítat výdaje na bydlení do příjmů i výdajů. Nerovnost a skladba chudých domácností závisí na zvoleném konceptu. První koncept započítává spotřební tok z bydlení odvozený od tržních nájmů podobných obydlí. Tento koncept je poprvé aplikován na data z ČR, a proto je mu věnována větší pozornost. Další koncept započítává reálnou hodnotu výdajů na bydlení a poslední koncept odečítá výdaje na bydlení úplně, aby srovnal životní úroveň domácností, jejíž měření je výdaji na bydlení zkreslováno. Tyto tři koncepty porovnávám jak v příjmové chudobě a nerovnosti, tak ve výdajové chudobě a nerovnosti. Výsledky ukázaly, že chudoba celé populace mírně vzrostla za sledované období, a obzvláště mezi lety 2010 a 2011. Nerovnost zůstala přibližně stejná pro všechny příjmové koncepty, ale koncepty výdajů zaznamenali mírné zvýšení během sledovaného období. To dokládá důležitost analýzy chudoby a nerovnosti nejen na základě příjmů. Zjistil jsem, že nejohroženější skupinou obyvatel jsou domácnosti jednoho rodiče s dětmi a děti obecně. V průběhu celé práce věnuji větší pozornost regulovanému nájemnému a vlivu deregulace nájemného. Studuji, jaký měl vliv dodatek, který prodloužil deregulační proces ve velkých městech do roku 2012 a zjišťuji, že zachoval regulované nájemné i mnohým bohatým domácnostem.

Klíčová slova

spotřeba, příjem, měření životních standardů, nerovnost, chudoba, spotřební tok z bydlení, imputovaný příjem z bydlení, vliv regulovaného nájemného, regulované nájemné

JEL Klasifikace

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Bachelor Thesis Proposal

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Preliminary scope of work Measuring living standards is an important activity that helps us identify development of poverty in recent years and stipulate changes in social and economic policies in the future. It is usual to measure living standards and poverty level with income, not with consumption, for its better accessibility and, thanks to bigger sample, easier work in statistics. A consumption flow (imputed income) from housing of households owning a dwelling is often neglected as well, even though it is an important part of consumption (income) and its omission can dramatically change results.

The main contribution of my work should be in measuring living standards using consumption with added consumption flow from housing and comparison of these results with results from measuring living standards using income with imputed income from housing.

I will use data from Czech Household Budget Survey from 1989 to 2011, which consists of about 3000 households every year. These households match the structure of households in the Czech Republic.

First, I would like to estimate the consumption flow (imputed income) from housing of households, which own dwellings or don't pay market rent. I will use regression on households paying market rent taking into account properties of dwelling, location, measurement year and pertinent changes in taxation similarly as mentioned in Mullan, Sutherland, Zantomio (2011). I will add the value of housing counted this way to consumption and income of households owning their own dwelling according to appropriate parameters. I will work with this modified consumption and income in further analyses.

I would like to find out how differently the analyses using income with imputed income from housing and using consumption with consumption flow from hous-

ing between years 1989 and 2011 testify about the development of inequality among people and poverty, about the distribution of age groups among the various deciles, about the distribution of households according to the legal reason for the use of the dwelling. Then I will try to answer these questions: What role does the legal reason for the use of the dwelling and its equipment play in consumption and income? What role do various expenditures in various deciles play over time? What is the consumption like in relation to income for various groups according to age, type of household, and work status? How does the consumption change for particular income groups, groups according to education and according to age? And how does income change for particular consumption groups? What is the connection between income and consumption?

I will answer these questions on the basis of standard work with the data, its distribution among groups and subsequent regression according to important parameters. I will take inspiration from the approach of Brewer, O'Dea (2012) during my work on these particular questions.

Last but not least, I will try to investigate how the abolition of rent control changed the value of dwelling. I will partly use results and approach from Tsharakyan (2011) for this. I will also investigate to what extent the abolition of rent control affects the distribution of households among various deciles according to the legal reason for the use of the dwelling.

Expected structure

1. Introduction
2. Literature review
3. Inclusion of consumption flow (imputed income) from housing
4. Analysis using income
5. Analysis using consumption
6. Comparison of the analyses
7. Conclusion

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Acronyms

HBS	Household Budget Survey
CZSO	Czech Statistical Office
OECD	Organization for Economic Co-operation and Development
PKOEF	Part of sample weight of household in the sample
IR	Imputed Rent
CZK	Czech koruna
BInc	Broad Income
NetInc	Net Income
AHInc	After Housing Costs Income
Con	Consumption
NetExp	Net Expenditures
AHExp	After Housing Costs Expenditures
OLS	Ordinary Least Squares
RESET	Regression Equation Specification Error Test

Chapter 1

Introduction

Measuring living standards and inequality is important and valuable activity which helps to evaluate existing and properly set new policies. It analyses which groups are endangered by poverty more than others and also which groups are well off.

For this purpose, one of income concepts is usually used. However, income shows only partial information about living standards and inequality. Brewer and O’Dea (2012) and many others argue that expenditures might give different view on living standards and inequality and expenditures can give even completely different results in measuring of poverty or inequality compared to income. There are several reasons why income is preferred by researchers. The main one is the easier and therefore cheaper collection of sufficiently large dataset of income than expenditures. Additionally, these income datasets are usually provided for longer time periods. The analysis is performed on the Household Budget Survey collected by the Czech Statistical Office. The Household Budget Survey contains both income and expenditures of a household. Therefore I will not miss my opportunity to use both income and expenditure measures to gain additional information on living standards and inequality in the Czech Republic.

This thesis measures living standards by three concepts of income and expenditures used by Mullan, Sutherland and Zantomio (2009). They differ in how housing is accounted for. Housing is very specific expenditure which matters a lot because it represents a large budget share for each household. However, this share differs on average for each tenure type. Outright owners do not

pay any rent for using their dwelling but they do still have increased living standard. It means that we meet an obstacle in determining living standards because renters project their rent into expenditures or pay it from their income but outright owners do not. This makes it hard to compare living standards of these households based on income or expenditures. We have to treat it somehow. To overstep this problem and gain more information, three concepts of income and expenditures are adopted. The first one, applied on the Czech data for the first time, estimates consumption flow from housing derived from market rents paid in similar dwellings. The whole Chapter 4 is dedicated to covering of this novelty concept properly. The second one includes real housing costs and the last concept deducts housing costs completely.

These three concepts of income and expenditures are used to analyse poverty and inequality in the Czech Republic over the period from 2006 to 2011. I will compare results from income and expenditures measures as well as different concepts of these two measures. What should come out is a wide overview of who is more likely to be poor and how different concepts measure inequality. The main aim of this work is showing the importance of the analysis of the living standards and inequality with more than narrow approach of one concept of income only.

In addition, this thesis analyses the cumulative impact of the crisis of 2008 and the deregulation process starting in 2007 and partially ending in 2010. The amendment of the law extended the deregulation period to 2012 in large towns so I will also focus on impacts of this amendment on living standards and poverty. To study this policy change properly, extra attention will be paid to regulated rent tenure type throughout the thesis. The suspicion is that inequality and poverty increased during the monitored years due to the crisis of 2008 and the deregulation period since many households had to pay more to stay in their dwelling.

This thesis is structured as follows: Chapter 2 compares advantages and disadvantages of income and expenditures as measures of living standards and inequality. Then I discuss how durable goods should be accounted for since consumption flow from these goods does not equal expenditures. Then history of regulated rent in the Czech Republic is briefly presented. Chapter 3 explains the treatment of the Household Budget Survey data collected by the Czech Sta-

tistical Office. Chapter 4 is dedicated to the estimation of consumption flow from housing for all households based on market rent tenants. I also analyse consumption flow patterns and differences between tenure types in this chapter. Chapter 5 is dedicated to measuring of poverty by all three concepts of income and expenditures. I analyse the poverty overlap of income and expenditures for all concepts, the composition of population below poverty line, and the differences between population below and above poverty line in owning of several durable goods. Chapter 6 analyses the overall inequality by Gini index, 90/10, 90/50, and 10/50 indices, and by the Theil index. Then the society is divided to deciles and analysed according to education and age. Last but not least, I analyse how housing costs changed over the monitored period and I focus on regulated rent tenants and how the deregulation process and the amendment affected their distribution over decile groups and their expenditures.

Chapter 2

Literature review

In this chapter, I will explain reasons to measure living standards and compare income and expenditures measures of living standards and poverty. I will point out advantages and disadvantages of these measures and how these measures are treated in referenced literature. This should provide a wide view on the topic and its difficulties to the reader because further chapters of this thesis are dedicated to comparison of poverty and inequality measures.

Last but not least, I will provide information on regulated rent tenure type since deregulation process was the major policy change affecting living standards in the Czech Republic during the monitored years 2006 to 2011.

2.1 Why do we measure living standards?

There are considerable reasons to measure living standards and inequality in societies. There is an incentive to measure inequality just for curiosity how the society distributes its means, but also to ascertain status quo of living standards of households as well as to determine which types of households are in favourable and unfavourable position among the others. All these information are of huge importance in determining the impact of a possible new government policy on different types of households and in optimizing a new policy to target the proper type of households. For example Mullan, Sutherland and Zantomio (2009) compare poverty estimates of subgroups of population for the Great Britain both under policy reform scenarios and actual policies. It gives government valuable feedback on already implemented government policies and social reforms as well. For example Brewer, Goodman and Leicester (2006)

study tax and benefit changes in Great Britain and how this affects pensioners. Generally, it is a question whether there are patterns from which researchers can make conclusions and subsequently politicians take actions. Brewer and O’Dea (2012) note that British government and European Union have high-profile poverty targets which might be good example why the measuring of living standards and successive reporting to government is worthwhile.

2.2 Difficulty of determining one’s well-being

We cannot simply compare inequality in material well-being of an individual due to impossibility of determining utility of a person and comparing it with another one’s, which would be a violation of one of the basic laws of microeconomics. It is common knowledge among economists that goods and services satisfy each person differently. For this topic see Hammond (1989). There is some necessary minimum what human being needs for surviving, but once this is fulfilled, there is no possibility how to simply and accurately say that one person is satisfied more than another from a particular good. There might be a contra-argument for this: We can say that people are willing to pay for a good according to their utility gained from this good. This is true, but not only this good is worth different value for each person. Even money paid for this good is valued differently for each person according to by economists well known law of decreasing marginal utility of money. Therefore, we have to take the impossibility of measuring the material well-being directly as a fact and settle for indirect methods. Therefore, we need some proxy variable which somehow relates to material well-being and would allow us to measure it at least indirectly. We have to find some collectible variable which is proxy to well-being of the household. There are a few options for this proxy variable as we will see.

2.3 Choose the right proxy variable

The question is whether income, expenditures, or any other variable is the right indicator for measuring living standards. Which proxy affects and determines living standards to the largest extent? Secondly, is a household the proper level of detail to measure material well-being? Is it better to use family or individual rather than household as a budget unit?

Common practice

Measuring living standards and inequality of households by income is used more frequently than measuring inequality by expenditures or consumption. There are several reasons for it mentioned by Meyer and Sullivan (2003). One of them is better collectibility of the income data since it is less demanding for households to complete income questionnaire than to fill in detailed questionnaire about expenditures and therefore cheaper for researchers to obtain data. Thus data on income are usually easier to access, in larger sample, and these data are often observed for longer time periods.

The proper level of detail: household x individual

Our desired level to measure well being is an individual because it is believed by economists that individual is the unit which experiences living standards. The problem is that we do not have any expenditures data on level of individuals. Moreover, members of household share their income as well. Therefore, we have to take into account the aggregate level of household. Household is understood as a group of individuals living under one roof and sharing one budget. It is a little different concept from family, although it is overlapping most of the time. The difference is that a household can be formed by not related individuals as well.

Dataset used in this thesis contains information on members of households so we can adjust measures to the desired level of an individual using one of the scales used in practice and mentioned by Sirovátka et al. (2002) to divide household level variable to each person. It is important to realize that for variables such as consumption it is not easy to drill-down to the level of an individual since there is consumption flow from durables for a whole household, and expenses on nondurables such as packet of pasta are not traceable to a particular individual. We will follow the convention in the official publications by conducting analysis of the income distribution or poverty status at the level of the individual by assigning to each individual their household's equalised income or expenditures. See Chapter 3 for more information.

Closeness of proxy variables to well-being

In opinion of Crossley and Pendakur (2002), there is an order in proxies of well-being and its proximity to well-being of household or individual. They think of chain as follows:

Wages → Earnings → Income → Consumption → Material Well-being

Where wages and earnings are interlinked by labour supply responses, earnings and income are interconnected by the tax and benefit system, and by saving behaviour in the past. Income retrenched of savings and added of borrowings forms consumption. Crossley and Pendakur (2002) also state: “*Finally, the link between consumption and material well-being is mediated by many ill-understood (at least by economists) psychological factors.*”

2.4 Differences between income and consumption

Households allocate their resources through time by complex patterns, but some behavioural rules rise above others. Budget units facing a lot of random income fluctuations in their income will try to save. Negative correlation exists between future risk and consumption because rational families save when risk is high as Crossley and Pendakur (2002) state.

Friedman (1957) states another difference between consumption and income. He argued that aggregate personal income should fluctuate more compared to aggregate personal consumption. This statement is based on the fact that individual can borrow in bad times and save in good times. Brewer and O’Dea (2012) note the same in other words. Brewer, Goodman and Leicester (2006) refer to this phenomenon as a consumption smoothing. Crossley and Pendakur (2002) state: “*recently this argument has been brought to the forefront of the microeconomic literature on inequality.*” They have outlined that at the micro level, households choose their consumption based on their past history of income and needs, their expectation of future income and needs, and conditions of the credit market including interest rate determining how savings, in other words postponed current consumption, are beneficial for the future consumption.

In addition, Cutler and Katz (1992) emphasize that according to economic theory, current income is not as accurate measure of the distribution of resources as permanent income or consumption. Blundell and Preston (1996) argue that both income and consumption reflect differences in living standards but variation in income arises also from short-run income variability. As Brewer, Goodman and Leicester (2006) state that income reflects temporary differences among people which can be unmeaningful or important in the long term. For example, income varies in the short term because of temporary unemployment, illness, irregular bonuses, or self-employment income streams. Brewer, Goodman and Leicester (2006) state that for long-run financial circumstances, spending is a better indicator than income. The same authors also note that spending should maintain a more constant level than income and thus be a better indicator of lifetime well-being and inequalities than more variable income.

Meyer and Sullivan (2003) present one additional difference between income and consumption by rephrasing of Cutler and Katz (1991): “*Income measures also fail to capture disparities in consumption that result from differences across families in the accumulation of assets or access to credit.*”

2.5 Income and consumption in the bottom of income distribution

There is a reason to prefer consumption rather than income as an indicator of poverty. Especially in the lowest percentiles of the income distribution, there is a lot of measurement error. According to Meyer and Sullivan (2003), this is caused by under-reporting of income in the lowest percentiles. It seems that specific types of income such as self-employment earnings, public transfers, and private transfers are under-reported. Meyer and Sullivan (2003) think income of an individual is more sensitive topic and easier to hide than consumption.

The ‘Tick’

There is also phenomenon called ‘Tick’ which speaks in favour of consumption. The ‘Tick’ applies to the lowest 2 percentiles of the households within income distribution in the Great Britain (Brewer, Goodman and Leicester, 2006). It

refers to the fact that for the individuals in the lowest income percentiles, their consumption is higher than their income. The reason why researchers call it tick is that it does not apply to individuals with a slightly higher income. Individuals with the lowest income have even higher consumption than individuals slightly above them according to income. This is possibly caused by short period lay-offs or any other reason causing the income to go down for a short period of time. During these periods of lowered and frequently even zero income individuals do not adjust their consumption because they expect the situation to change.

2.6 Consumption x Expenditures

From the arguments stated above, one can conclude that there is conceptual reason to prefer consumption to income in measuring poverty or inequality, and that consumption is the best proxy of material well-being. Unfortunately, consumption has its drawbacks, too. Consumption data are much more costly to collect for a given sample size compared to income data. Thus datasets with consumption information are much smaller (Meyer and Sullivan, 2003). In addition, Crossley and Pendakur (2002) did not mention one stage in their chain, even though they take it into account. It is called expenditures and this stage is between income and consumption. It is based on the fact that it is very difficult to measure consumption of durable goods such as housing consumption (Goodman and Oldfield, 2004). It was stated above that we cannot directly observe material well-being of an individual. The problem is that we do not have the possibility to accurately divide consumption flow from durable goods such as television or car between members of household. This will be addressed in Chapter 3 more properly. In order to try to be in the chain of variables related to material well-being as close as possible, it is necessary to select observable variable related to consumption. This proxy variable of consumption is expenditures. Crossley and Pendakur (2002) state “*Unfortunately, we are typically unable to perfectly separate durables from nondurables and unable to perfectly estimate the consumption flow from durables.*” We as researchers have a possibility to gather mainly data on expenditures and not consumption.

Lump sum expenditures

It is very important to distinguish between consumption and expenditure. As Brewer and O'Dea (2012) state, expenditures do not need equal consumption since portion of expenditures might reflect investments and in addition households derive their consumption from durables they own. There is a problem that expenditures for durable goods, which household consequently consume, are usually paid by lump sum, even though there is irrefutable long-lasting improvement in material well-being of consumers of durable goods. Brewer, Goodman and Leicester (2006) also explain that expenditures are not the same as consumption. People get benefits from durable goods such as car or housing for a long time but they have to pay a lot of money up-front for these items by one-off payment. Meyer and Sullivan (2003) explain: “*Expenditures reflect a family’s long term prospects but may be lumpy because of the indivisibility of certain purchases such as houses and cars. Consumption though should reflect the smoothed flow of services obtained from these durable goods.*” Brewer, Goodman and Leicester (2006) also state that expenditures can be more variable because it is lumpy and people can live off their earlier spending.

2.7 Accounting for durable goods in expenditures

Even though measuring monetary expenses as a proxy for consumption has its drawbacks, it is still the best known way how to deal with measuring living standards from the consumption point of view. We can try to smooth this difference between monetary expenses and consumption by the inclusion of estimate of consumption flow from durable goods as suggested by Crossley and Pendakur (2002). They focused on measuring expenses which in case of non-durable goods are assumed to be the same as consumption and in addition they imputed consumption flow from housing. Brewer and O'Dea (2012) suggest the same approach with consumption defined as expenditures plus the estimated benefits from durable goods, including housing.

Consumption and expenditures differ for all durable goods, not only housing. As Brewer, Goodman and Leicester (2006) note, all durable goods provide a stream of consumption benefits after lump sum expenditure. However, situation in estimating of consumption flow from other durable goods than housing is much worse because there is no such wide and liquid market for these durable

goods defining value based on the characteristics of a particular durable good. Due to this we do not have a source for gathering data to estimate rental equivalent of durable goods but housing (Brewer, Goodman and Leicester, 2006). Therefore, we assume expenditures to equal consumption for other durable goods.

Housing expenditures

As Brewer, Goodman and Leicester (2006) state, housing expenditures do not reflect consumption flow from housing for homeowners. There is a way how to deal with this problem for those who do not pay the market rent for their housing. Data on market rent for an accommodation paid by a particular household on a rental market provide us with important information how different characteristics of an accommodation influence the market rent. Based on this information, it is possible to predict imputed rent for households not paying market rent (Brewer and O’Dea, 2012).

Brewer and O’Dea (2012) suggest including difference between expenses and consumption flow from housing by imputed rent for other than private rent tenants. They do not and cannot observe a rental value for owner-occupiers or for tenants of subsidized housing. “*We observe a rent which will typically be less than the market rent. We therefore need to estimate the rent that owner-occupiers and social tenants would pay for their property if they rented it on the private market,*” they state. Brewer and O’Dea (2012) use approach of imputing rent for each property according to several characteristics of the dwelling such as geographical region, the number of rooms, or local taxation bill. They take into account a few other characteristics of the dwelling as well. Approach of Mullan, Sutherland and Zantomio (2009) uses the housing costs-to-quality relationship observed in the private rental market and imputes value for housing consumption for all tenure types. Mullan, Sutherland and Zantomio (2009) estimate a hedonic regression of monthly price on a sample of dwellings rented in the private market. Based on this regression, they are able to predict the imputed rent for owned, social rented and rent-free accommodation. Mullan, Sutherland and Zantomio (2009) predict the net imputed rent which is the difference between actual gross rent for households having non-privately rented dwelling and what would household pay for renting in the private market. The same approach will be used in this thesis.

2.8 Regulated rent tenure type in the Czech Republic

Until 2012, one additional tenure type to tenure types mentioned by Mullan, Sutherland and Zantomio (2009) existed in the Czech Republic, namely the regulated rent tenure type in addition to own outright, private rent, social rent, and rent free legal reason for the use of the dwelling. The deregulation process started in 2007 with partial ending in 2010 and complete removal of regulated rent in 2012. Since this was major policy change which took place during the years analysed by this thesis (2006-2011) affecting expenditures of households, I will shortly explain history of regulated rent tenure type in the Czech Republic and I will give more attention to regulated rent tenants in further analysis.

History of regulated rent tenure type in the Czech Republic

Regulated rent was introduced after the Second World War in the majority of countries as a reaction to a shortage of flats (Sunega, 2002). A simple non-targeted rent regulation of setting upward ceilings on the rent level was the case of the Czech Republic (Tsharakyan and Zemčík, 2011). It led to a lack of interest in building new accommodation by private capital. This lack of investing by private sector was largely substituted by public sector building of new accommodation which led to even larger proportion of state owned rental housing (Lux, 2000). In addition, communist regime nationalised all housing stock with the exception of family houses (Lux, 2000). In the 1980s people started to receive an exclusive 'decree' entitling them with the right to unlimited stay at the flat (Tsharakyan and Zemčík, 2011). This right cannot be rescinded and, moreover, it was automatically inherited to their children as Lux (2000) states. After 1989, the Czech Republic inherited regulated rent type of tenure from the communist era. This historical development led to a higher share of rental sector in the Czech Republic compared to the average of Central and Eastern European countries after the Velvet Revolution of 1989 (Jahoda and Špalková, 2012). The difference between regulated rent and market rent was unacceptably high after the rent liberalization, and in some regions even tenfold (Sunega, 2002). Real regulated rent increased only by 87% between 1989 and 2000, so this difference between regulated and market rent was persistent (Sunega, 2002). Each country solved problematic regulated rent differently.

Tsharakyan and Zemčík (2011) state that some countries such as Bulgaria and Estonia abandoned regulated rent tenancy after 2000 and some countries such as Poland significantly reformed this policy. Situation in the Czech Republic was different. Since 1989, there was nearly no change on this topic due to non-active and reluctant politicians in the Czech Republic who did not want to solve this sensitive topic for a very long time (Lux, 2000). Situation has changed only after the ruling of the European Court for Human Rights in the case of Hutten-Czapská in 2005, and several other rulings decided in favour of homeowners owning regulated rent apartments (Jahoda and Špalková, 2012). Facing possible future wave of lawsuits, politicians in the Czech Republic took action and agreed on the deregulation process starting from January 2007 (Jahoda and Špalková, 2012). The original deregulation process should have ended by 2010 already. However, the law was amended in 2009 due to concerns about social situation of households living in rental flats. The amendment postponed complete removal in selected towns and localities to the end of 2012 as Jahoda and Špalková (2012) inform. The extended deregulation process accounted for 40% of all regulated rent households.

Effects of regulated rent

Since renting market in the Czech Republic is quite big, this change could have huge impact on distribution of households according to the legal reason for the use of the dwelling because regulated rent type of tenants had to choose if they remain in a rented dwelling but for market price or they buy their own dwelling as studied Tsharakyan and Zemčík (2011). Regulated rent also distorts market with rental housing (Sunega, 2002). There is smaller supply of market rental housing since households using exclusive preferential right to live in regulated rent tenancy do not want to leave their accommodation because they would lose this right (Sunega, 2002). He also states that regulation of rents is one of the worst public interventions with several negative impacts. It selectively reduces availability of housing, increases average dilapidation of available housing, enables overconsumption of housing services by regulated rent tenants, sharply increases prices on rental market, creates local monopolies on the housing market, spreads black market, and leads to long-lasting negative expectations of private capital.

As stated above, regulated rent market sets far higher equilibrium where the

demand for rental apartments crosses the supply than in case of all rental apartments being included in the rental market. This situation was not stable during the deregulation period. Recently emptied regulated rent apartments cause rise of the supply side on the rental market and therefore affect housing market equilibrium (Lux, Sunega, Kostecký and Čermák, 2003). Therefore, it might be interesting to monitor changes in value of imputed rent from housing for regulated rents as well as for the rest of households not paying market rent during the deregulation period from 2006 to 2012 since the imputed rent or consumption flow from housing is derived from the free market rent which is unsteady during the deregulation period. The most predominant factor of the deregulation period is the increase of housing costs for regulated rent tenants. Jahoda and Špalková (2012) state that expenditures of households on housing grow with increase in rents and this can possibly lead to increase of number of households considered poor. Due to this, the deregulation process is not negligible in studying inequality and poverty in the Czech Republic.

Chapter 3

Data Chapter

This chapter is dedicated to the description of the Czech Household Budget Survey data as the main source of data for this thesis. All the information are based on CZSO (2012) published by the Czech Statistical Office (CZSO) which also provides the data. This source covers development of data and sample method in recent years.

3.1 General characteristics

Household Budget Survey (HBS) provides information on expenditure and consumption structure of private households. It also provides information on consumption patterns and differences between households classified by various aspects. The HBS collects various information on household members from age and education to current employment. It also includes information about various attributes of household's dwelling. It is possible to derive effect of certain factors such as price movements, or situation in the market on expenditure structure of households. There is no other source of data on consumption behavior of households in the Czech Republic. The HBS is unique dataset for the Czech households. This paper works with HBS data between years 2006 and 2011.

3.2 Sample

Size of the sample

The CZSO gathers data from approximately 2900 (+ 400 supplementary sample till 2010) households every year. Sampling size slightly differs for each year.

The CZSO gathers data in a rotating sample where only some 25% of households are replaced each year in order to maintain representativeness and the proper composition of various aspects of households. This feature differentiates it from the EU-Statistics on Income and Living Conditions, which is a random sample series of cross-section drawn each year.

Supplementary sample

The HBS included supplementary sample of approximately 400 minimum income households to gain deeper knowledge about this group. The income level had to be under certain level to be classified as a minimum income household. The supplementary sample was cancelled in 2011, but low income households are present in the basic sample as well. These households will extend my sample for estimation of imputed rent, but they are of no use in further analysis since only households from basic sample are weighted appropriately to represent the Czech population.

Sampling unit and household size equivalence scale

The sampling unit of HBS is a private household since a private household is the most sensible definition of a budget unit. Household is viewed as a group of individuals having common budget. They do not have to be family, although these concepts are overlapping most of the time. However, CZSO collects data on members of household in HBS as well. Therefore, we know how many people live in a household. However, there is a problem of certain types of expenditures (e.g. heating) not increasing in the same proportion as the amount of people. To account for this problem of decreasing marginal living cost of an additional member of household, HBS uses one of the Organization for Economic Co-operation and Development (OECD) scales assigning coefficient of 1 consumer unit for the first adult person (head of household), 0.7 for the second and each of the following adult person and child above 13 years old, and 0.5 for each child between 0 and 13 years old. Sirovátka, Mareš, Večerník and Zelený (2002) refer to more equivalence scales such as square root equivalence scale, modified OECD scale, and McClements scale. This paper works with the OECD scale mentioned above. Therefore, every poverty rate or another variable related to an individual is calculated by using household's equivalised income or consumption.

Representativeness

CZSO selects households of the HBS based on purposive quota sampling. It means that CZSO divides a population of households into mutually exclusive sub-groups and survey an appropriate amount of households following the composition of attributes in the household structure in the Czech Republic. This helps to have better representativeness of all groups and in contrast to random sampling it helps to avoid a risk of not covering particular groups or attributes appropriately. This sample is then weighted appropriately.

The CZSO covers all types of households previously excluded in the HBS from 2006. It means households of unemployed, households of pensioners with economically active members or households with no economically active person.

The CZSO samples households in the HBS according to attributes such as net money income per household member or number of dependent children for households of employees and households of the self-employed, and pension per household member and number of members for households without economically active members. It also covers household distribution across the legal reasons for the use of the dwelling and a few more. For further details on sorting factor see CZSO (2012).

3.3 Weighting and reflecting the reality in the Czech Republic

The sample is collected by purposive quota sampling method. This is made for accounting for all types of households. In order to reflect each type of household in the Czech Republic in the proper proportion of population and in order to refer to the Czech population, we have to include conversion rate PKOEF which is provided in the HBS for each observation. This conversion rate adjusts the weight of counting for the particular household type and its members in the holistic view for the Czech Republic. In addition, CZSO weights types of households by surveying them for an appropriate number of months. This weight of individual groups of households matches with the group percentage as measured by Living Conditions survey.

Survey was kept a different duration period for each household but still in

the way to account evenly for groups of household, number of children and income brackets. Therefore, we have to take into account a number of months a questionnaire was kept and divide total variables by a number of months to get proper monthly values.

3.4 Money equivalence scale

To compare values from different years, it is necessary to adjust money for the inflation in the Czech Republic. Whenever I refer to equivalised Czech koruna (CZK), it means CZK adjusted for inflation. It means CZK with purchasing power in 2005 as this is the standard base year in the inflation data provided by the CZSO.

3.5 Expenditure and income measures

The HBS records two types of income and expenditure. It is gross monetary income, gross monetary expenditure, net monetary income, and net monetary expenditure. According to CZSO (2012):

- Gross monetary income is defined as monetary inflow net of borrowings and credits received and savings drawn.
- Net monetary income differs from the gross monetary income by health and social insurance payments and income tax
- Gross monetary expenditures are defined as cash outlays minus deposits, cash-free paid up loans, paid up credits and borrowings.
- Net monetary expenditures are gross monetary expenditures net of health and social insurance payments and income tax.

Net monetary income and net monetary expenditures are used for the analysis in this thesis, as well as net income and net expenditures with two different modifications. One deducts housing costs and the second one adds the estimated non-paid benefit from housing to its housing costs for households not paying market rent. For further explanation of this modification see Chapter 4. All concepts of income and expenditures are explained in the further chapters.

Chapter 4

Imputing rent from housing

This chapter deals with obtaining of imputed rent or in other words consumption flow from housing. This method is used on the Czech dataset for the first time and therefore it needs more attention.

Housing is one of a few durable goods each household consumes. Unfortunately, we are able to observe only expenses on housing. As stated in the Chapter 2, expenses on housing are fundamentally different from consumption flow from housing for all types of legal reason for the use of the dwelling with the exception of private market rent, which is assumed to reflect consumption flow in monetary units according to quality of housing (Brewer and O’Dea, 2012). The rest of households not paying private rent usually have lower housing costs than households with the same quality of housing but paying private rent. The difference can be called non-paid benefit from the housing or free consumption flow from housing. Therefore, to reflect that additional consumption flow from housing, which is not-accounted in expenses, I will predict and impute gross rent from housing for all the rest of types of tenure but renting on private rental market.

4.1 Definition and characteristics of imputed rent from housing

Imputed rent from housing can be defined as the difference between the housing costs including rent that household would need to pay if renting on private market, and its current costs incurred by living in the dwelling. Costs incurred by living in the dwelling or in other words gross rent means its maintenance

and other services in addition to the rent paid for the use of the dwelling.

Costs incurred by living in the dwelling can be formulated in the HBS expenditure categories as rent paid for the first (main) residence, electricity, gas, heat and hot water, water and sewerage, other services related to flat, and solid waste collection.

There is one additional category called other rent which includes rent for secondary dwelling, for garage, or for anything else. I have decided not to include it in costs incurred by living in the dwelling which are used to estimate imputed rent since it does not relate to consumption flow from the main residence and I do not control in estimation of imputed rent for any variables related to the other residence. Moreover, this expense is recorded only for 4% of the households in the HBS. Therefore, I find it reasonable to not include this expense in my estimation of imputing rent and also I find it reasonable to let this expense in its real value for each household.

Obviously, for the private market rent tenants imputed rent is zero because they have been paying its market rent already and by the logic of applied process of imputing rent we cannot get more realistic housing costs for them than housing costs already reported. Mullan, Sutherland and Zantomio (2009) treat private market rent tenants in the same way.

4.2 Methodology

Method of imputing rent in this paper is mainly inspired by Mullan, Sutherland and Zantomio (2009) with regard to methods used by Crossley and Pendakur (2002) and Brewer and O'Dea (2012).

First, I have to predict rent which households would pay if they paid rents equal to rents on private rental market. This is done by using households from the private market rent tenure type to estimate a hedonic regression for market rent using reported information about gross rent paid and the same house characteristics as Mullan, Sutherland and Zantomio (2009), Crossley and Pendakur (2002), and Brewer and O'Dea (2012). I will use the same notation as Mullan, Sutherland and Zantomio (2009) and call this predicted rent gross Imputed Rent (IR).

There is one additional step, done by Mullan, Sutherland and Zantomio (2009) as well, to get net Imputed Rent (IR), in other words the benefit which households not paying market rent gain from their housing and are not paying for it because they are paying lower rent than on the private market or no rent in case of households owning its dwelling. To obtain net IR, current costs incurred by living in the dwelling must be deducted from the gross IR. By this, not-paid benefit from housing for all households with exception of market rental dwelling is estimated. This net IR will be added to overall income and expenses in the following chapters as an estimate of not-paid benefit from housing for a particular household.

- Gross IR is estimation of consumption flow from housing for a particular household.
- Net IR is estimation of non-paid benefit from housing for a particular household.

Formulating of net IR has its benefit even though adding it to the real housing costs is the same as taking gross IR instead of real housing costs. Mullan, Sutherland and Zantomio (2009) mention that imputing rent by this method “allows us to estimate the ‘social wage’ element of imputed rent for social tenants and a value for those living rent-free, as well as the IR of owned accommodation.” In addition, I will analyse imputed rent for tenants with regulated rent since this sector was a large share of Czech households.

4.3 Sample for imputing rent

Imputing rent to households is based on prediction based on households paying private market rent. The distribution of particular tenure types for each year in the sample and in the Czech population can be seen in the Table 4.1 below. How share of tenure types developed in the time is showed in Table 4.4 again and examined there in more detail. I did not include five observations with not-specified rent but having rental apartment in Table 4.1 . It was not possible to determine whether these households are regulated or private tenure type. I also did not include 12 observations of staff apartment in this table because it is represented by a very small amount of households. I will not mention these two tenure types in further analyses based on tenure type due

to its non-representativeness or unclear definition. We can also see that in case of private market rent numbers seem to be sufficient for each year to secure representativeness. However, the sample of private rent tenants is considerably smaller for each year than in Great Britain used by Mullan, Sutherland and Zantomio (2009) and Brewer and O’Dea (2012), or in Canada used by Crossley and Pendakur (2002) or Milligan (2008).

Table 4.1: Housing tenure distribution in the sample and in the Czech population

Year		2006	2007	2008	2009	2010	2011	Total
Private rent	No. of obs.	154	172	160	179	218	378	1261
	% in pop.	3.5	3.9	3.5	3.7	4.5	11.9	
Regulated rent	No. of obs.	626	600	571	506	468	158	2929
	% in pop.	17.7	17.2	16.3	15.0	13.5	5.6	
Cooperative apart.	No. of obs.	608	555	527	491	477	424	3082
	% in pop.	18.0	16.4	16.0	15.2	14.8	14.2	
Own outright apart.	No. of obs.	571	625	638	665	726	691	3916
	% in pop.	17.1	18.5	19.6	21.1	22.9	24.2	
Own outright house	No. of obs.	1284	1269	1247	1222	1209	1123	7354
	% in pop.	40.2	41.0	40.9	40.7	39.8	39.7	
Rent free	No. of obs.	127	111	123	142	152	130	785
	% in pop.	3.3	2.9	3.5	4.2	4.6	4.4	
Total		3377	3334	3271	3207	3251	2904	19344

Source: Author’s computation using the HBS 2006-2011.

As we can see, we have 1261 observations for private rent tenure type which we need to estimate an imputed rent. However, this is not yet the sample we will use in the hedonistic regression estimating gross IR. In treating with furnished rental apartments, this study applies same approach as Brewer and O’Dea (2012). They excluded households renting furnished rental housing from the predicting regression. This study treats furnished rental apartments in the same way. Reasoning behind this is that furnished factor does not relate to consumption flow from housing but from other durables. Moreover, the HBS records if the housing is furnished only for private market rental apartments and this is hardly comparable with the rest of households. Due to this the sample used to predict gross IR decreased to 1019 households.

These observations are also from the supplementary sample since it extends the number of observations used in the hedonistic regression and it should not

hurt the results. However, I will exclude these observations from the supplementary sample right after the regression because this sample does not have any weight coefficient connecting it with the Czech population.

4.4 Hedonistic regression of gross imputed rent characteristics

Researchers assume that private market rent is the closest proxy to consumption flow from housing. I will use market rent for my estimation as well. Private market tenants renting unfurnished accommodation from 2006 to 2011 are used for prediction of gross IR. Total number of households having private market rental apartments in the dataset after exclusion of furnished ones is 1019. Information on housing characteristics is used to estimate IR. Predicting gross IR is based on hedonistic regression where as inspired by reference literature (Brewer and O’Dea (2012), Crossley and Pendakur (2002), Mullan, Sutherland and Zantomio (2009)), we control for region of household, type of house, number of rooms, a year an observation was entered, and whether household is located in a village, a town or a county seat. It is important to mention that there were some changes in the regression form compared to the reference literature. These changes are explained below.

Counting for local tax regime

Brewer and O’Dea (2012) and Mullan, Sutherland and Zantomio (2009) also control for local tax regime which does not allow the imputed rent of household to vary with the change in the coefficient of tax. The HBS includes simplified information on locality, such as county, district, and a size of municipality according to number of inhabitants represented by size groups. Unfortunately, these size groups in the HBS are provided with different brackets than the brackets specified by the Real Estate Tax Act, Act No. 338/1992. Moreover, according to Real Estate Tax Act, each municipality can slightly change the coefficient for particular areas. Therefore, it is not possible to sufficiently determine which tax coefficient is valid for a particular household and I cannot control it in the prediction of IR.

Counting for type of house

In this thesis, the regression form includes dummies on type of house as well. Even though type of house is not controlled in any reference literature I believe it has its place in the hedonistic regression of gross rent. In my opinion, there is valid reason to believe that a type of house affects gross rent as well. Basically, apartments of different types are often run differently on average regarding heat, water and sewerage, or gas. I can also think for example of some economies of scale in heating for family house with two apartments or semi-detached houses compared to single-family houses. Based on this supposition, I find it rational, since it is available in the HBS, to use information on house type to control for possible differences. These types are single-family house, family house with two apartments, semi-detached or terrace house, apartment block, and other building (or undetected).

Level-level type of regression

It is true that log-level type of regression can be interpreted in more human-eye readable way as coefficients mean how an explanatory variable affects explained variable in a percentage change from an intercept. In contrast to log-level, level-level type shows the effect of explanatory variables on explained variable in units (in our case Czech koruna) (Wooldridge, 2009). Log-level type of regression for predicting imputed rent is performed by Brewer and O’Dea (2012) and Mullan, Sutherland and Zantomio (2009). Crossley and Pendakur (2002) and Milligan (2008) did level-level type and estimated the gross imputed rent as the average rent for accommodation with the same number of rooms in the same year and region. For the HBS, Level-level type of regression gives much better results as well. It explains larger share of variability for the HBS. Therefore, I have decided to incline towards level-level type of regression as Crossley and Pendakur (2002) and Milligan (2008) did.

Regression tests

I have run some tests (explained in Wooldridge (2009)) on gross imputed rent results. White test showed us that the sample is heteroskedastic. Breusch-Pagan test showed heteroskedasticity of the sample as well. Thus, I ran robust Ordinary Least Squares (OLS) regression and all confidence intervals are robust. I ran Ramsey Regression Equation Specification Error Test (RESET) to check

for the general specification of the form of the explanatory variables as well. I had to strongly reject null hypothesis that there is no omitted variable. The test reported that there is something wrong and some explanatory variable form or multiplication is missing. This problem was solved by adding multiplication of region and number of rooms. In other words, I enabled imputed rent for any additional room to vary for each region. Ramsey RESET test and the original form of regression model (Table B.1 are described in Appendix B in detail. I checked for correlation as well. The biggest correlation is between Prague and County seat which makes sense since Prague is county seat, county and city in one. Variables Prague and County seat have correlation of 0.595 which is still far from multicollinearity, so no change was made.

4.5 Gross imputed rent results

The reference accommodation is an apartment with three rooms in the family house with two apartments, located in Pardubice Region in a village municipality of year 2006. Coefficients in Table 4.2 can be interpreted as the increase in the average monthly gross rent in Czech crowns (CZK), or in my notation gross IR, compared to the reference accommodation, other things being equal.

As you can see, explanatory (dummy) variables with insignificant coefficients remained in the model because there is a theoretical reason to believe they are valid. Moreover, the significance of variables depends on chosen reference accommodation as well.

We can see that reference accommodation in a family house with two apartments, in a village placed in Pardubice Region with 3 rooms in year 2006 has gross IR of 1900.7 CZK. If it were semi-detached or terrace house, household would pay 454.8 CZK more. In the Other building placed household would pay 1036.8 CZK more on average on its gross rent. Living in an apartment block rises gross rent by 1447.2 CZK on average and living in a single-family house is the most expensive with gross rent per month nearly 1600 CZK higher than the reference accommodation.

If a household was placed in the town, it would pay additional 780.6 CZK on average on its monthly gross rent. Living in one of 14 county seats would increase gross IR by 1017.3 CZK. We can see that moving across the time into

Table 4.2: Hedonistic regression of gross rent

Explanatory variables	coefficient	(s.e.)
Single-family house	1597.9***	(490.9)
Semi-detached, Terrace house	454.8	(460.0)
Apartment block	1447.2***	(216.1)
Other building	1036.8***	(382.9)
County seat	1017.3***	(202.9)
Town	780.6***	(161.9)
Prague	5111.6***	(640.6)
Central Bohemian Region	1303.0**	(658.2)
South Bohemian Region	438.6	(513.0)
Plzen Region	517.0	(501.0)
Karlovy Vary Region	1004.7*	(512.3)
Usti nad Labem Region	744.7	(459.6)
Liberec Region	987.0*	(513.4)
Hradec Kralove Region	2329.4***	(630.2)
Highlands Region	184.6	(491.9)
South Moravian Region	170.6	(480.1)
Olomouc Region	862.9	(605.0)
Zlin Region	2536.0***	(690.3)
Moravian-Silesian Region	1224.3**	(475.2)
Room in Prague	2065.9***	(301.7)
Room in Central Bohemian Region	752.6**	(308.8)
Room in South Bohemian Region	601.9***	(157.6)
Room in Plzen Region	717.1***	(155.0)
Room in Karlovy Vary Region	1232.3***	(205.9)
Room in Usti nad Labem Region	723.3***	(179.7)
Room in Liberec Region	960.4***	(221.4)
Room in Hradec Kralove Region	1444.1***	(323.6)
Room in Pardubice Region	878.3**	(382.9)
Room in Highlands Region	307.9*	(181.3)
Room in South Moravian Region	478.8***	(182.1)
Room in Olomouc Region	1068.7**	(418.3)
Room in Zlin Region	1537.8***	(338.9)
Room in Moravian-Silesian Region	1047.5***	(160.9)
Year 2007	38.59	(228.6)
Year 2008	188.1	(239.2)
Year 2009	1063.7***	(241.4)
Year 2010	1167.2***	(227.7)
Year 2011	1436.0***	(204.3)
Intercept	1900.7***	(501.2)
<i>N</i>	1019	
adj. <i>R</i> ²	0.419	

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Author's computation using the HBS 2006-2011 households having unfurnished private market rent tenancy

the future from 2006 would increase the gross imputed rent in all monitored years. In 2007, the gross IR would be higher by only 38.6 CZK. In year 2008, household would have higher monthly gross rent by nearly 190 CZK. The gross IR in the year 2009 rose sharply. Compared to the year 2006, household would pay for its gross rent additional 1063.7 CZK on average. The year 2010 increased gross IR by 1167.2 CZK and the year 2011 caused gross IR to increase by 1436 CZK per month on average.

Location across the regions affects the gross IR as well. The largest increase in the monthly gross rent is in Prague with value exceeding the reference accommodation by 5111.6 CZK on average. The second largest is the effect of the Zlin Region with increase of 2536 CZK. Hradec Kralove Region has higher gross IR by 2329.4 on average compared to the reference accommodation. Households in the Central Bohemian Region have gross IR higher by 1303 CZK and Moravian-Silesian households have gross imputed rent higher by 1224.3 CZK on average. Households living in the Karlovy Vary Region have gross IR higher slightly over 1000 CZK. Location in the Liberec Region affects gross IR by 987 CZK and the Olomouc Region has higher gross IR by 862.9 CZK. There is the Usti nad Labem Region with gross IR 744.7 CZK above reference accommodation. The Plzen Region has gross IR higher by 517 CZK and the South Bohemian Region has gross IR higher by nearly 440 CZK compared to the Pardubice region, other things being equal. The last two regions above the reference region, the Highlands Region and the South Moravian Region have higher gross IR between 170 and 190 CZK. The lowest value of gross IR across all regions has the referential Pardubice Region.

Gross IR is affected by number of rooms as well. This effect is different from region to region. The highest increase in gross IR from additional room is in Prague with value 2065.9 CZK. Other two regions with the highest increase per additional room are the Zlin Region and the Hradec Kralove Region with values between 1540 and 1440 CZK. Any additional room in the Karlovy Vary Region increases monthly average gross rent by 1232.3 CZK, in the Olomouc Region by 1068.7 CZK, in the Moravian-Silesian Region by 1047.5 CZK and in the Liberec Region by 960.4 CZK. Any additional room in the Pardubice Region increases gross IR by 878.3 CZK. In the Central Bohemian Region, the Usti nad Labem Region, and the Plzen Region is the increase of the gross IR with any additional room between 717 and 753 CZK. The South Bohemian Region rooms increases

gross IR by slightly more than 600 CZK. The lowest increase in the gross IR is in the South Moravian Region and the Highlands Region with values 478.8 and 307.9 CZK respectively.

We can observe surprisingly huge differences in gross IR between regions. The highest gross IRs are in Prague followed by the Hradec Kralove Region and the Zlin Region. The lowest are in the Highlands Region and the South Moravian Region. Coefficients for years fulfilled expectations since they are close to inflation of housing but it is right that they are not equal to inflation since the sample is weighted. Coefficients for households placed in village, town, or county seat municipality make also sense since there is an assumption of having better access to public utilities reflected in higher demand for this housing and therefore higher rent charged. The regression discovered lower gross rent for households living in the family house with two apartments, and semi-detached or terrace house. It can be related to lower rent or the dwelling costs and would deserve further study.

4.6 Net imputed rent compared to gross imputed rent

There is only last step to obtain not-paid benefit from housing for each household (net IR) - deduction of real housing costs from gross IR. When this is done, I can impute this net IR to the housing costs and obtain my estimation of consumption flow from housing. This method is equivalent with taking gross IR instead of housing costs. I show net IR to get some idea how big non-paid benefit from housing to households is. This table shows mean of the net imputed rent for each tenure type in comparison to mean of gross IR for households in the Czech Republic. In addition, table shows share of each tenure type in the Czech Republic.

We can see that monthly gross IR is quite similar for each tenure type with exception of rent free tenure type. These differences in gross IR can speak about the different average size of housing or different housing costs related to each tenure type. Net IR is more interesting. It tells us how big is the non-paid benefit from housing on average in a particular tenure type. With preference of real gross market rent over estimated gross IR, it makes sense that private rent net

Table 4.3: Average monthly gross and net imputed rent (in equivalised CZK) according to housing tenure type

Tenure type	Gross IR	Net IR	Pop in %
Private rent	4842.6	0	5.1
Regulated rent	5440.7	931.4	14.2
Cooperative apartment	5744.6	1732.6	15.8
Own outright apartment	5398.9	1873.4	20.6
Own outright house	5175.9	2473.0	40.4
Rent free	4052.9	2295.5	3.8
Total	5288.5	1879.3	100

Author's computation using the HBS 2006-2011.

IR is 0, since I did not impute gross IR to this tenure type. Households with regulated rent are earning non-paid benefit from housing of 931.4 equivalised CZK on average. The regulated rent net IR is compared to the private rent net IR and to the rest of tenure types, and it is completely according to expectations. Regulated rent benefit should not be as high as for the rest since regulated rent tenants are paying a small rent but of course there should be some non-paid benefit for these households. Cooperative apartment compared to own outright apartment has probably on average higher real housing costs and thus larger difference between its gross IR and net IR. There is a big difference between own outright house and apartment. Again, I can think of lower real housing costs on average in this tenure type but only guess what the explanation of it is. It could be for example thanks to wider usage of heat insulation or thanks to having their own well and thus not paying any water and sewerage, but there are many possible explanations. Quite predictably, rent free tenure type has the highest portion of net IR on its gross IR. It is not the highest net IR but this is related with quite lower gross IR indicating smaller accommodations. It is also possible that for these households some part of other housing costs such as electricity, gas, solid waste collection, etc. is paid by their donors of housing (the most often family) as well. From the table we can also see that there is high share of households living in its own - own outright apartment and house - altogether 61% of the Czech population. We can see that the regulated rent represented almost three quarters of rental market with its 14.2% share in the Czech population compared to only 5.1% share of private rent tenants in the Czech population.

Negative net IR

Negative net IR means that household is paying more than is estimated consumption flow from their housing. When checked for percentage of negative net IR, I have found that nearly 28.1% of regulated rent tenants in the population have negative IR. For cooperative apartments, 13.8% of households have negative net IR. These numbers are quite high and I can imagine that large share of negative net IR is caused by large variation and not perfect estimation, which is right only on average. Second reason can be as mentioned by Brewer and O’Dea (2012) that people have some transaction costs (certainly financial and arguably psychological) to leave an accommodation where they live and thus they might choose to live in their current even though it would be better to live somewhere else. The rest of tenure types have better numbers. Own outright apartment with 7.6% of negative net IR, 9.9% for own outright house tenure type and 7.6% for rent free tenure type.

4.7 Net imputed rent according to years and tenure type

By appropriate weighting, it is possible to obtain household shares for each tenure type in the Czech Republic. We could see overall values for all years in Table 4.3. The following Table 4.4 shows percentage share of each tenure type in the Czech population for each year between 2006 and 2011. Table 4.4 shows the average net IRs in equivalised CZK for each tenure type in each year as well. The row Total net IR shows monthly average net IR in equivalised CZK for a whole population.

According to the HBS rental market in the Czech Republic was dramatically changing during the deregulation period. The share of regulated rents decreased each year. This happens due to ending of preferential agreement but as studied by Tsharakyan(2011) mostly because households in regulated rent tenancy type have to decide each year whether it is still economically advantageous to stay in regulated rent apartment with increasing rent, buy that apartment, or move to a smaller apartment or house more appropriate to household’s income and the capability of paying the housing costs. Increase in the real housing costs (rent particularly) of regulated rent tenure type is documented by decreasing net IR of regulated rent tenancy type together with increasing overall gross IR

Table 4.4: Average monthly net IR for each year according to tenure type (equivalised CZK); % share of tenure type in the Czech Republic for each year

Tenure type		2006	2007	2008	2009	2010	2011
Private rent	Net IR	0.0	0.0	0.0	0.0	0.0	0.0
	% in pop.	3.5	3.9	3.5	3.7	4.5	11.9
Regulated rent	Net IR	1345.9	1111.6	701.2	833.2	547.8	886.8
	% in pop.	17.7	17.2	16.3	15.0	13.5	5.6
Cooperative apart.	Net IR	1798.5	1601.0	1406.2	1960.1	1831.9	1823.5
	% in pop.	18.0	16.4	16.0	15.2	14.8	14.2
Own outright apart.	Net IR	1715.8	1633.8	1567.3	2043.7	2020.4	2135.5
	% in pop.	17.1	18.5	19.6	21.1	22.9	24.2
Own outright house	Net IR	2269.6	2369.2	2101.8	2581.3	2660.8	2875.8
	% in pop.	40.2	41.0	40.9	40.7	39.8	39.7
Rent free	Net IR	1903.3	2027.8	1956.9	2572.6	2428.5	2635.7
	% in pop.	3.3	2.9	3.5	4.2	4.6	4.4
Total net IR		1835.4	1789.6	1578.4	2015.5	1978.1	2082.1

Author's computation using the HBS 2006-2011.

every year. The biggest change was between 2010 and 2011. Year 2011 was different. As Jahoda and Špalková (2012) mention, the original deregulation process should have ended and regulation of rent should have been completely removed by 2010 already. In 2009, the law was amended due to concerns about the social situation of households living in rental flats influenced by rising house prices. The amendment postponed the end of the deregulation period in selected towns and localities to the end of 2012. These new conditions applied to approximately 40% of rental apartments with regulated tenancy as state Jahoda and Špalková (2012), and my calculations confirm that in 2011 share of regulated rent tenure type was around 40% of share of regulated rent tenure type in the whole population of 2010. This amendment explains the radical drop of population share but also the increase of the net IR of regulated rent tenants because the households which remained in this tenure type were located in big cities, where the private market rents are higher. Sharp increase in the share of private rent tenants in 2011 relates to the partial end of deregulation process as well.

As regards the rest of the tenure types, we can observe steady decrease of share of households having cooperative apartment and steady increase of share of households having own outright apartment. The share of households owning

their house in the Czech population remained around 40% throughout studied period and the share of rent free households had increased a little bit but still represented a minority of the Czech households. We can notice that in 2009, there is a quite significant increase in the net IR of households of all tenure types with an obvious exception of the market rent. This jump would definitely deserve further study. We can also see that the last 3 years net IR is higher for all tenure types with exception of the regulated and the market rent. We can conclude that any avoiding of paying regulated or private rent was more advantageous in the recent years than before.

4.8 Net imputed rent according to age groups and tenure type

In this section, I will show how net IR and tenure type is distributed to age groups. Whole population was split into 3 groups according to age of head of household. First group contains households with head of household aged 18 and above and below 40. Second group is for households having head of household 40 and above and below 65 years old and the last group is for households with head aged 65 and more. Table 4.5 below shows a share of the particular age group in tenure type and its equivalised net IR regarding a tenure type.

Table 4.5: Average net imputed rent for age groups according to housing tenure type (equivalised CZK)

Tenure type	Age 18-40		Age 40-65		Age 65+	
	Net IR	in %	Net IR	in %	Net IR	in %
Private rent	0	11.6	0	3.3	0	2.4
Regulated rent	518.7	13.9	923.0	14.2	1326.5	14.5
Cooperative apartment	1373.3	12.8	1599.8	18.5	2421.8	13.3
Own outright apartment	1646.1	20.5	1800.1	19.8	2203.5	22.0
Own outright house	2478.3	32.4	2455.9	42.1	2500.4	44.7
Rent free	2418.6	8.6	2030.1	1.9	2287.8	2.8
Total	1598.0	100	1859.1	100	2188.1	100

Author's computation using the HBS 2006-2011.

We can notice that the youngest age group had different distribution across the tenure types. Compared to other two groups, 18-40 group lives considerably more in a private rent and rent free. This is balanced by lower share of

young population living in their own house. This is nothing surprising and in accordance with common sense. Young households often live in houses of their family without paying rent. They also did not accumulated so much wealth during their lifetime compared to the older households and therefore they live more often in private rent during this stage of life. Group age of 65+ have slightly higher share of population in own outright house and apartment balanced by lower population share for this group in cooperative apartments.

As regards net IR, we can notice that the oldest age group have the highest overall non-paid benefit from housing. The largest difference compared to the rest of population is in regulated rent, cooperative apartment and own outright apartment tenure types. This is true for all tenure types. I suppose this can be caused by living in the accommodation with higher quality and lower costs since this group had more time during their lifetime to find the good deal housing and remain in it. For example, good terms offered by regulated rent tenure type can restrain motivation to move to other accommodation.

4.9 Households with mortgage

Until now I have worked with gross IR and net IR not accounting for mortgages. Although payment for mortgage can be interpreted as housing cost, it is not included in net monetary expenditure and mortgages are deducted from inflow of money to get net monetary income as well because it is paid up credit. Therefore, deducting mortgages in net IR would mean that I have to add it once more to net monetary expenditure or income to counter the effect and to maintain right values. In this study, net IR is imputed to households with mortgage with justification that this value estimates better the consumption flow from housing than if I would in addition deduct a mortgage payment. This method of adding net IR to housing costs is equivalent with imputing gross IR instead of housing costs.

Example on accounting for mortgage

From the following example it must be obvious, there is no change in accounting for mortgage and Table 4.5 will just show how mortgages relate to consumption flow from housing. Imagine that household have 10 000 of net expenditures with housing costs included, 500 of net imputed rent and 1000 of mortgage

payment per month. Its net expenditures with added net IR would be 10500. If I account for mortgage in housing costs, it would mean that net expenditures with housing costs are 11000 and net IR is -500. Therefore, net expenditures with housing costs including mortgage added for net IR of -500 would equal 10500 as well. From this it is obvious that the approaches are equal.

Results on net IR accounted for mortgage

Households can be overpaying their consumption flow from housing by high mortgages in order to use non-paid benefits from housing in the future. This is another justification to not account for mortgages in net monetary income and expenditure since it represents investment into housing. Overpaying of consumption flow from housing would be shown as negative net IR for these households having mortgage. The difference in net IR with and without mortgage is shown in the following table. Table 4.6 shows penetration of mortgage payments in the particular tenure type in the Czech Republic, mean of equivalised net IR for households having mortgage and mean of equivalised net IR after deduction of mortgage. These numbers for an average Czech household in the particular tenure type are based on a sample of 3300 households having mortgage in the HBS between 2006 and 2011.

Table 4.6: Households with mortgage and its net imputed rent (equivalised CZK)

Tenure type	Net IR	Net IR - Mort.	Penetration in %
Private rent	0.0	-2296.8	4.1
Regulated rent	470.3	-1181.2	3.7
Cooperative apart.	1634.6	-821.5	13.1
Own outright apart.	1605.6	-2228.4	21.4
Own outright house	2653.3	-1091.9	20.8
Rent free	1280.5	-2796.8	3.6
Total	2106.7	-1408.1	15.7

Author's computation using the HBS 2006-2011; only households with mortgage

Households having mortgage in private rent, regulated rent, and rent free tenure type are small minority with penetration about 4%. Cooperative apartment tenure type has 13.1% penetration of mortgages and own outright apartment and house have penetration around 21%. The overall penetration for all households in the Czech Republic is 15.7%.

As we can see, net IR deducted for mortgage is negative for all tenure types. From this we can conclude that households having mortgage are paying on housing more on average than they consume. This speaks in favour of my supposition that mortgage serves as investment to benefit from housing later.

Since I try to estimate cash equivalent of consumption flow from housing and impute it instead of real housing expenditures for housing, I will not take mortgages into account anymore.

Chapter 5

Analysis of relative poverty

Poverty is unwanted social phenomenon that the society would like to avoid. In spite of term of poverty being connected with the developing world these days, poverty is measured in developed countries, too. Measuring of poverty is important for government to provide necessary feedback to their current policies of minimizing the poverty as well as to determine whether there should be any new policy. Measuring of poverty has importance in distribution of social help as stated by Š Šustová (2012). Measuring of poverty also provides valuable information on composition of poverty stricken group. This information can be used in more accurate targeting of current policies on the most endangered groups or in determining a target group for the future policy. Measuring of poverty is also important for comparison internationally.

Many researchers are concerned with the level of the living standards and poverty. However, vast majority of studies is based on income of a household as a measure (Brewer and O’Dea, 2012). This chapter should show that the income measure is not the only measure of poverty and there are diverse options how to treat these measures regarding the housing costs.

5.1 Definition of relative poverty

There are different methods of measuring poverty country by country. In developed countries it does not relate to the affordability of a sufficient nutrition. We consider individual being in a relative poverty whenever she lives in a household having equalised income or expenses under 60% of the whole population median. This methodology is used by Eurostat for the data on the European Union

member states and for the comparison among them. By equivalised income or expenses are meant income or expenses adjusted for a size of a household. The poverty line is defined by the OECD as a 60% of median equivalised income (Sirovátka, Mareš, Večerník and Zelený, 2002), (Brewer and O’Dea, 2012). We will use this poverty line for expenditures, too. This poverty line is widely used and although there is some theoretical discussion, this poverty line is generally accepted. Blastland (2009) in his article explains why 60% of equivalised income or expenditures median and not 55 or 65: “*The line is to some extent arbitrary, but is now used internationally and seems to reflect a view that this is the point at which people struggle to share the ordinary expectations of the majority.*”

The convention is to conduct analysis of poverty status at the level of individual. Therefore, income and expenditures are adjusted to take into account household composition and size. Household income or expenditures are converted to income or expenditures of one consumer unit according to OECD equivalence scale assigning 1 consumer unit to the first individual (head of household), 0.7 consumer unit to any next adult, and 0.5 consumer unit to each child under 14.

5.2 Concepts of income and expenditures used to measure poverty

This chapter focuses on determining and comparing of poverty by income and expenditures and their different concepts.

As Mullan, Sutherland and Zantomio (2009) state, number of people being regarded as poor (below threshold line) depends on the income concept adopted. In addition, it also depends whether the poverty is derived from income or expenditures. Moreover, different concepts of income and expenditures can testify quite differently to composition of the population below the relative poverty line.

Three concepts of income and three concepts of expenditures with difference in accounting for housing costs are studied in this thesis. Recognising that the

housing costs do not always match housing consumption as noted by Brewer and O’Dea (2012), I differentiated three approaches to account for housing:

- Real measure of income and expenses accounting for housing as it is with no regard whether a household owns or rents its dwelling. Income concept with this approach to housing costs is called Net Income (NetInc) and is explained in the Chapter 3. Expenditures treated in the same way are called net expenditures Net Expenditures (NetExp).
- Concept of income and expenditures with account for housing and the estimated non-paid benefit called net imputed rent. I refer further on to this income concept as Broad Income (BInc) and to comparable expenditures as Consumption (Con) as Brewer and O’Dea (2012) did since I included predicted consumption flow from housing and the rest of expenditures are assumed to be equal to consumption flow.
- Measure of income and expenses with deducted housing costs as a second approach to detach the effect of tenure type from the rest of expenditures widely used by researchers. I refer to this income as After Housing Costs Income (AHInc) and to this concept of expenditures as After Housing Costs Expenditures (AHExp) further on.

The logic behind the deduction of housing costs or addition of imputed rent to income measure is that a household would pay it from its income in any case. These concepts of income and expenditures are used in the analysis of poverty and inequality often but not always all in one study. For example, Brewer and O’Dea (2012) use measures of BInc, Con and NetInc for the Great Britain. Mullan, Sutherland and Zantomio (2009) use all concepts of income, Š Šustová (2012) uses NetInc for analysis of poverty in the Czech Republic, Tachovská (2013) uses AHInc and AHExp for the Czech Republic, Blundell and Preston (1996), and Goodman and Oldfield (2004) use NetInc and NetExp for the GB. Figure 5.1 below shows how different concepts of income relate to each other and the same relationships for expendirues concepts as well.

Figure 5.1: Concepts of income and expenditures



5.3 Results

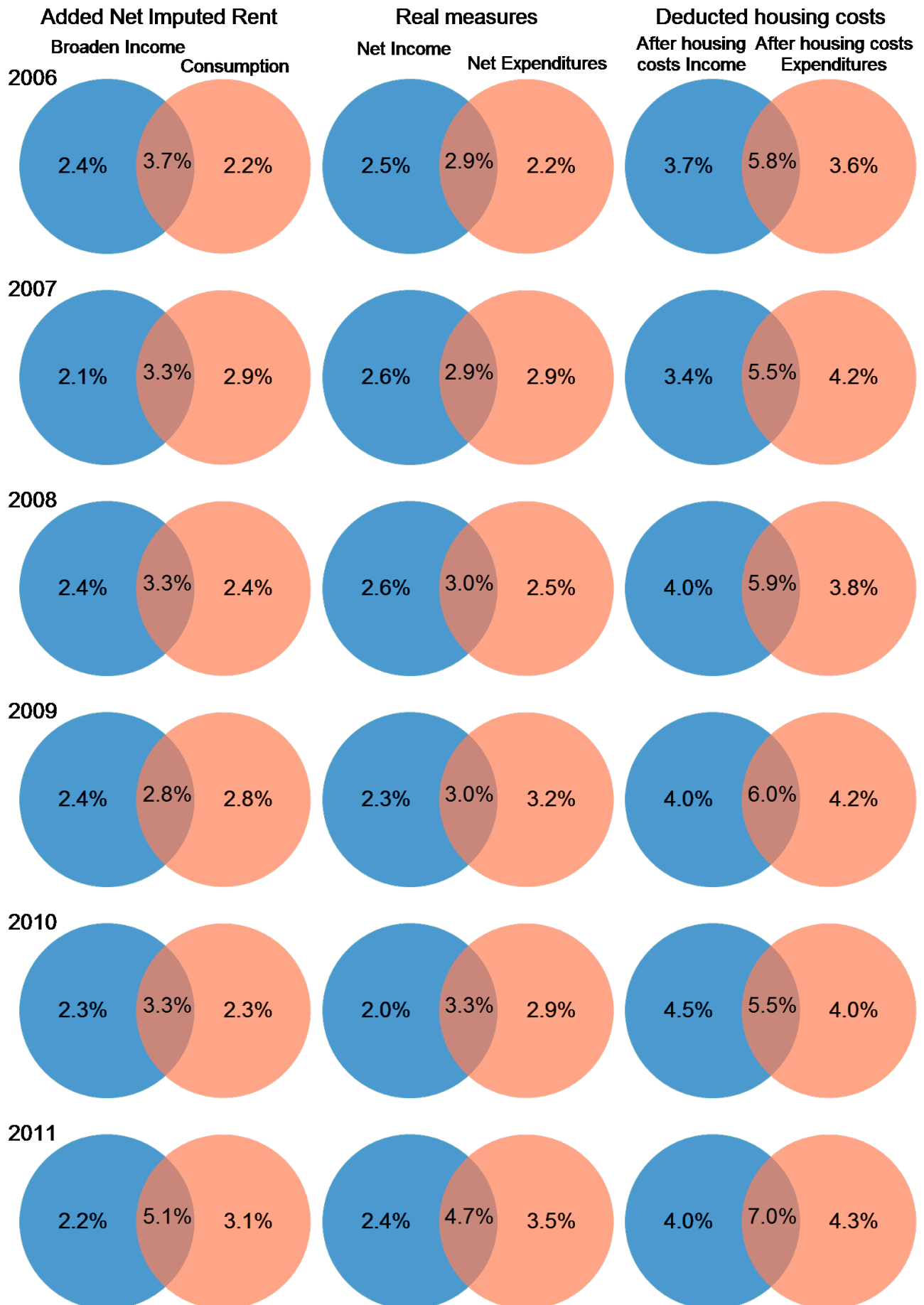
Size of the Czech population below the poverty line and its overlap for comparable concepts of income and expenditures

Each concept of income is calculated differently and thus there is a different poverty line. They have one in common. They are all derived as a 60% of a median of equivalised income or expenditures depending on used measure. The median values for each measure can be seen in Table 6.1. Figure 5.2 shows a share of the Czech population below the poverty line for each of the concept applied. Moreover, the following Figure 5.2 displays overlap of the comparable concepts of income and expenditures in the Venn diagrams, in the same way as Brewer, Goodman and Leicester (2006) did. In the following diagrams, a blue circle represents income measure and a red represents expenditure measure. The purple intersection represents the share of the Czech population considered in relative poverty by both measures. For each year there are 3 measures of income and 3 measures of expenses as explained in Section 5.2.

As we can see, for each year and each pair of measurements, purple intersections are the highest share. This fact means that more than half of the individuals considered as poor by one measure are considered as poor by the other comparable measure. This is good news since we can conclude that income has informative value corresponding to the poverty levels measured by expenditures, closer proxy to well being as noted by Crossley and Pendakur (2002). However, there is slightly larger poverty detected by all three expenditures concepts than by their income counterparts. These results are in accordance with Brewer and O’Dea (2012) findings for GB. In spite of this fact, we can see that the share of the Czech population considered poor by income is quite similar to the share by expenditures. However, there is a problem that the share of people being poor by income and not by expenditures and the other way around is not small either. It can definitely influence the composition of the poor people. I will analyse composition in the next section.

When we compare the results from these three approaches, we can see that the results for BInc, Con and for NetInc, NetExp are quite similar. The largest difference is between these two approaches and the third one of deducted housing costs (AHInc, AHExp). This can be explained by a larger share of the housing

Figure 5.2: Share of the Czech population below poverty line by different measures



Author's computation using the HBS 2006-2011. Households below poverty line defined by equivalised measures and then weighted by equivalence scale and sampling weight of household.

costs on a household budget for a lower part of the income/expenditures distribution. Households from a lower part of the distribution but not below poverty line in the BInc, Con, NetInc and NetExp having larger share of housing costs on their expenditures than is the decrease of median from these measures to AHInc, AHExp median are probable to join the group below the poverty line. Table A.6 shows that richer household means lower share of housing costs on a household budget.

Figure 5.2 contains additional information. Even though the poverty rates are changing throughout the period of 2006-2010, we cannot conclude that there was move in any direction because different measures are moving in an opposite direction but still around 6% for BInc, Con, NetInc, and NetExp and from 9 to 10% for AHInc and AHExp. However, all measures increased between 2010 and 2011 largely. The lowest increase is 1% in AHInc and the biggest is 2.4% in Consumption. This increase corresponds with the findings of Š Šustová (2012) on income distribution. She attributed cause to the crisis and its deferred impact on the Czech households. The numbers are a little bit different. The difference between approach of this thesis and her approach is the used equivalence scale. She uses modified OECD scale compared to original OECD scale used in this thesis.

The composition of individuals below the poverty line

As I stated before, composition of individuals below the poverty level can be different for each measure. Table 5.1 below shows the composition of individuals below the poverty line according to their age category of child, adult, or pensioner for each measure and the total share of the age category in the Czech population. In this case, number of people instead of equivalence scale was used for households below poverty line defined by standard method. The reason behind this is to avoid mismeasurement of poverty for children which represents only 0.5 consumer unit.

Table 5.1: Composition of the group below poverty line by age categories and different measures

	BInc	NetInc	AHInc	Con	NetExp	AHExp	Total
Pensioners							
2006	0.068	0.102	0.237	0.059	0.083	0.217	0.223
2007	0.065	0.109	0.248	0.080	0.165	0.277	0.225
2008	0.092	0.136	0.291	0.099	0.167	0.299	0.228
2009	0.060	0.087	0.268	0.084	0.146	0.282	0.229
2010	0.046	0.064	0.241	0.040	0.115	0.218	0.230
2011	0.024	0.026	0.146	0.030	0.059	0.139	0.235
Children							
2006	0.456	0.423	0.335	0.428	0.417	0.330	0.256
2007	0.464	0.425	0.339	0.425	0.364	0.300	0.253
2008	0.451	0.415	0.327	0.425	0.370	0.298	0.255
2009	0.457	0.423	0.325	0.452	0.393	0.310	0.252
2010	0.462	0.428	0.325	0.459	0.398	0.328	0.253
2011	0.506	0.496	0.409	0.491	0.464	0.391	0.255
Adults							
2006	0.477	0.475	0.428	0.513	0.500	0.453	0.521
2007	0.471	0.466	0.413	0.496	0.471	0.423	0.522
2008	0.456	0.449	0.382	0.476	0.464	0.403	0.517
2009	0.483	0.490	0.407	0.464	0.461	0.409	0.519
2010	0.492	0.508	0.435	0.501	0.487	0.453	0.516
2011	0.470	0.477	0.445	0.479	0.476	0.470	0.510

Author's computation using the HBS 2006-2011. Households below poverty line weighted by number of people and sampling weight of household.

As regards share of the total population, we can see that there was a small increase of pensioners in the whole population at the expense of share of adults. A situation below the poverty line was different. Shares of each category according to different measures differ but for all measures with exception of AHExp, the share of the pensioners below the poverty line is much lower than in the whole population. In accordance with Š Ťustová (2012) results, children are the most endangered group because there is much higher share of children below the poverty line than in the whole population. Share of adults below the poverty line corresponds to a slightly higher share in the whole population.

For all measures, a share of pensioners below the poverty line increased between 2006 and 2008 and then it decreased in contrast to Š Ťustová (2012) results. The completely opposite development is observed in the share of adults below the poverty line. Since pensioners get their pensions constantly, this develop-

ment had to be caused by a change in the adult age category. We can conclude that worsening macro-economical situation fall on adults much more than on pensioners. Poverty share of children remained constant till 2010. There was large increase in the poverty share of children between years 2010 and 2011 in all measures ranging from 3.2% in Con to 8.4% in AHInc. Generally, the increase was the smallest when accounted for imputed rent from housing and the largest when the housing costs were deducted. This increase in the child poverty was balanced by sharp drop in the pensioner poverty.

Again, we can conclude that families with children were hit by crisis in larger extent. This can be easily verified in the next table (Table 5.2) which analyze the group below the poverty line of equivalised income or expenditures from the type of household view and compares it with a share in the whole population. The CZSO divides households into 9 categories according to type. These categories are: couple without children, couple with children, couple with relatives, family with children and with other relatives, lone parent with children, lone parent with children and other relatives, non-family household and single individual household - male, female. Table 5.2 does not include marginal categories below 1% share in total population. Table 5.2 uses the same weighting as Table 5.1.

We can notice that couples without children are below the poverty line in a much smaller proportion than in the whole population. The opposite applies for households of lone parent with children where the share below the poverty line is for some measures fivefold compared to the proportion in the whole population. Large share of poor individuals according to equivalised income or expenditures are couples with children. However this share corresponds to the proportion in the whole population. For BInc,Con, and NetInc,NetExp it is higher and for AHInc and AHExp it is lower than the proportion in the whole population. This can mean that housing costs of a household do not increase with any additional child as much as the equivalence scale adding 0.5 consumer unit to each child below 14.

The proportion of female and male individuals below the poverty line for AHInc and AHExp measures compared to the rest of measures is also interesting. We can conclude that individuals more often pay high housing costs. It makes sense since individuals do not use large economies of scale in housing costs. Thus,

Table 5.2: Composition of the group below poverty line by household type and different measures

	BInc	NetInc	AHInc	Con	NetExp	AHExp	Total
Couple, no children							
2006	0.042	0.049	0.059	0.057	0.053	0.072	0.283
2007	0.041	0.042	0.057	0.068	0.094	0.123	0.284
2008	0.063	0.052	0.075	0.082	0.117	0.153	0.282
2009	0.026	0.018	0.048	0.056	0.077	0.127	0.284
2010	0.024	0.023	0.053	0.025	0.105	0.103	0.281
2011	0.017	0.012	0.029	0.026	0.033	0.078	0.280
Couple, children							
2006	0.560	0.440	0.369	0.552	0.511	0.398	0.453
2007	0.487	0.426	0.336	0.512	0.371	0.309	0.443
2008	0.530	0.436	0.348	0.522	0.456	0.322	0.440
2009	0.479	0.435	0.339	0.574	0.479	0.324	0.439
2010	0.463	0.419	0.327	0.559	0.471	0.352	0.439
2011	0.480	0.477	0.360	0.553	0.518	0.391	0.425
Couple and relatives							
2006	0.036	0.036	0.032	0.084	0.072	0.057	0.054
2007	0.016	0.016	0.016	0.083	0.091	0.062	0.060
2008	0.013	0.014	0.016	0.066	0.084	0.056	0.061
2009	0.014	0.015	0.018	0.055	0.067	0.053	0.055
2010	0.041	0.051	0.027	0.078	0.079	0.066	0.057
2011	0.041	0.023	0.038	0.076	0.089	0.075	0.059
Lone parent, children							
2006	0.269	0.323	0.245	0.236	0.254	0.216	0.065
2007	0.337	0.303	0.266	0.246	0.257	0.229	0.066
2008	0.272	0.287	0.237	0.241	0.209	0.214	0.070
2009	0.340	0.330	0.258	0.245	0.242	0.239	0.072
2010	0.348	0.323	0.272	0.247	0.224	0.231	0.070
2011	0.377	0.374	0.344	0.286	0.272	0.290	0.080
Lone parent, children and relatives							
2006	0.011	0.013	0.013	0.008	0.014	0.019	0.016
2007	0.038	0.057	0.040	0.035	0.056	0.038	0.017
2008	0.035	0.034	0.024	0.030	0.018	0.026	0.017
2009	0.044	0.037	0.027	0.023	0.017	0.030	0.019
2010	0.045	0.042	0.032	0.038	0.029	0.039	0.016
2011	0.040	0.035	0.028	0.036	0.036	0.034	0.019
Single male							
2006	0.029	0.039	0.058	0.026	0.035	0.053	0.030
2007	0.031	0.045	0.062	0.016	0.030	0.049	0.030
2008	0.026	0.045	0.061	0.015	0.024	0.049	0.029
2009	0.021	0.034	0.048	0.009	0.037	0.033	0.029
2010	0.024	0.050	0.057	0.015	0.033	0.044	0.030
2011	0.013	0.029	0.039	0.004	0.017	0.022	0.030
Single female							
2006	0.054	0.100	0.222	0.038	0.062	0.182	0.090
2007	0.041	0.103	0.217	0.032	0.092	0.182	0.089
2008	0.052	0.124	0.231	0.036	0.078	0.172	0.093
2009	0.061	0.117	0.255	0.025	0.073	0.182	0.095
2010	0.044	0.082	0.226	0.027	0.048	0.150	0.098
2011	0.031	0.049	0.159	0.012	0.030	0.106	0.099

when housing costs are deducted in AHInc and AHExp measures, it affects these groups more than others.

The year 2011 meant change in the proportion of categories below the poverty line. Poverty rate of couples without children and individuals decreased sharply in each measure. People considered poor in 2011 were more often from families with children and from households of one parent with children.

Table 5.3 below shows relative poverty rates for tenure types and years for all six measures and the proportion of tenure type in the whole population. The numbers in the table mean share of households of a particular tenure type below the 60% of median of equivalised income or expenditures.

It depicts gradual decrease of the regulated rent tenure type in the whole population share same as decrease of share below the poverty line with a large drop between 2010 and 2011 during the partial end of the deregulation period as explained in Chapter 4. This decrease was balanced by sharp increase in poverty of households having private rent. The poverty rate of households having its own house decreased a lot in 2011 as well. Poverty of own outright apartment households moved in the opposite direction for all measures with exception of AHInc. Poverty of households having cooperative apartment also decreased with partial ending of deregulation period. More and more rent free households were considered poor during this period according to all concepts of income and expenditures. We can see that same measures behave differently for different tenure types as for example lower AHInc and AHExp for private rent and own outright house and higher for cooperative or own outright apartment. We can conclude that deregulation process had large impact on proportion of tenure types in the whole population as well as on composition of households below equivalised poverty line.

Table 5.3: Composition of the group below poverty line by tenure type and different measures

	BInc	NetInc	AHInc	Con	NetExp	AHExp	Total
Private rent							
2006	0.101	0.086	0.080	0.116	0.078	0.060	0.035
2007	0.107	0.071	0.063	0.075	0.062	0.053	0.039
2008	0.102	0.079	0.053	0.095	0.075	0.055	0.035
2009	0.106	0.086	0.060	0.113	0.075	0.057	0.037
2010	0.098	0.078	0.088	0.136	0.078	0.087	0.045
2011	0.338	0.281	0.257	0.337	0.225	0.260	0.119
Regulated rent							
2006	0.226	0.214	0.238	0.235	0.196	0.262	0.177
2007	0.267	0.207	0.289	0.222	0.180	0.280	0.172
2008	0.284	0.233	0.299	0.279	0.214	0.306	0.163
2009	0.269	0.216	0.277	0.242	0.142	0.268	0.150
2010	0.206	0.159	0.235	0.247	0.163	0.251	0.135
2011	0.053	0.037	0.101	0.046	0.039	0.095	0.056
Cooperative apartment							
2006	0.155	0.163	0.201	0.099	0.139	0.210	0.180
2007	0.140	0.147	0.174	0.139	0.110	0.170	0.164
2008	0.133	0.132	0.142	0.144	0.145	0.178	0.160
2009	0.096	0.121	0.140	0.101	0.128	0.177	0.152
2010	0.160	0.116	0.142	0.115	0.140	0.164	0.148
2011	0.091	0.084	0.132	0.095	0.102	0.127	0.142
Own outright apartment							
2006	0.112	0.168	0.224	0.145	0.158	0.186	0.171
2007	0.139	0.168	0.223	0.189	0.197	0.214	0.185
2008	0.140	0.146	0.219	0.136	0.153	0.218	0.196
2009	0.133	0.142	0.201	0.127	0.144	0.208	0.211
2010	0.166	0.197	0.244	0.143	0.165	0.216	0.229
2011	0.226	0.208	0.232	0.215	0.197	0.245	0.242
Own outright house							
2006	0.326	0.298	0.221	0.318	0.335	0.244	0.402
2007	0.294	0.330	0.223	0.314	0.379	0.250	0.410
2008	0.254	0.311	0.231	0.286	0.339	0.219	0.409
2009	0.312	0.300	0.262	0.322	0.388	0.241	0.407
2010	0.290	0.322	0.227	0.282	0.305	0.213	0.398
2011	0.192	0.247	0.206	0.219	0.275	0.189	0.397
Rent free							
2006	0.079	0.077	0.037	0.086	0.093	0.039	0.033
2007	0.054	0.076	0.028	0.062	0.072	0.032	0.029
2008	0.087	0.099	0.056	0.060	0.073	0.024	0.035
2009	0.084	0.135	0.060	0.095	0.123	0.050	0.042
2010	0.080	0.128	0.064	0.076	0.149	0.068	0.046
2011	0.099	0.143	0.073	0.086	0.162	0.083	0.044

Author's computation using the HBS 2006-2011.

Poverty and durable goods

Table A.1 is inspired by Brewer and O’Dea (2012) and shows how households considered poor differ in owning some durable goods such as car, washing machine and so on. Low column means proportion of households considered poor (below 60% of equivalised median) having at least one piece of the durable good. Column called Notlow contains proportion of households above 60% of equivalised median owning at least one piece of the durable good.

Table A.1 here

We can notice that there is a huge difference (approximately 30% for each measure) between poor and not poor population in owning a car. Car can be considered as luxury good. In contrast, TV, washing machine, or microwave oven is distributed similarly below the poverty line and above.

Table A.1 also shows the difference between measures for owning a durable good. It implicitly says that households considered poor are not same for all measures. For example PC is considered as luxury good by AHInc and AHExp measures but in BInc and Con measures PC have approximately the same penetration.

5.4 Summary

We could see in this chapter how different measures of income and expenditures measure poverty differently. We could also see the relation and intersection between same concept income and expenditures. I tried to show which groups are more endangered by poverty by dividing the Czech population to age categories, tenure types and household composition. The analysis showed that it is important to measure poverty by other measures and concepts than one measure of income, which is in order with referenced literature. In accordance with Brewer and O’Dea (2012) findings for the GB, I found that poverty measured by various concepts of expenditures was higher than measure by their income counterparts. It also showed that the group below the poverty line changed its composition during the monitored years partly by ongoing deregulation process and partly by the delayed effects of crisis. I found out that the most endangered group in the Czech Republic are lone parents with children and

private rent tenants whose proportion in the Czech population and also below the poverty line rose dramatically by the partial end of deregulation period in 2010. Compared to Š Šustová (2012) results, my results were slightly different because of different equivalence scale used. The overall poverty of the Czech population discovered in this thesis was lower by a few percents compared to Š Šustová (2012) results and I did not find the Czech pensioners as really the most endangered group but I found, in accordance with her, that the families with children and especially lone parents with children are the groups with the highest proportion below the poverty line.

Chapter 6

Inequality and living standards in the Czech Republic

The concept of inequality is used less in analysing society than concept of poverty even though they relate to each other to a large extent. According to McKay (2002), measuring inequality is important for determining the causes of poverty. He states that increased inequality for a given level of average income almost always implies higher level of absolute poverty and relative poverty as well. McKay (2002) defines inequality as a “*variation in living standards across a whole population.*”

This chapter is dedicated to analysis of inequality in the Czech Republic between 2006 and 2011. I will compare how different measures defined in the Chapter 5 (BInc, NetInc, AHInc, Con, NetExp, and AHExp) testify about inequality in the Czech Republic. As Goodman and Webb (1995) point out: “*There are many households throughout the population who are ranked differently by expenditure than by income.*”

Firstly, I will examine how the distribution according to different measures looks like. Secondly, I will analyse the overall inequality by 5 coefficients: Gini coefficient, 90/10, 10/50, and 90/50 ratio, and the Theil Index. Then, I will examine who is more probable to be where in the income/expenditures distribution. Various categories of expenditures will be examined, too. Last but not least, I will look on housing and regulated rent tenants in more detail.

6.1 Distribution of income and expenditures measures

Mean and median of various measures

There are large differences between concepts of income and expenses. Table 6.1 shows mean and median (50th percentile) of all six equalised for the size of the household measures in equalised CZK (2005 prices).

Table 6.1: Mean of equalised household income/expenditures (equalised CZK)

	BInc	NetInc	AHInc	Con	NetExp	AHExp
Mean						
2006	12844.7	11847.1	10114.2	11933.6	10936.1	9203.1
2007	13402.1	12430.0	10719.6	12848.7	11876.7	10166.3
2008	13630.0	12769.2	11006.9	12371.3	11510.6	9748.2
2009	14159.8	13054.7	11119.9	12896.8	11791.7	9856.9
2010	14238.8	13150.2	11174.2	12844.8	11756.2	9779.9
2011	14114.2	12965.6	10940.0	12964.4	11815.8	9789.6
Median						
2006	11825.0	10689.9	9065.2	10675.8	9594.4	7877.9
2007	12347.0	11320.1	9662.4	11061.4	9985.5	8319.4
2008	12383.9	11510.8	9864.5	11068.3	10112.3	8468.5
2009	12905.7	11738.2	10004.1	11431.9	10260.5	8416.7
2010	12998.7	11880.9	10047.1	11407.3	10229.9	8295.7
2011	13044.7	11784.4	9944.7	11545.1	10306.9	8288.2

Author's computation using the HBS 2006-2011.

Predictably, income and expenses measures with imputed rent (BInc, Con) are the highest in both income and expenditures categories and measures with deducted housing costs (AHInc, AHExp) are the lowest.

Interesting is that mean for the whole population rose only for 5 out of 6 measures. AHExp measure stagnated. We can assume that additional wealth acquired in the monitored years fell on increased housing costs. However, situation is a little bit more complicated. We can see that all measures struggle from 2009 on and all 3 concepts of income in equalised CZK fell between 2010 and 2011 according to mean. Median says the same story with NetInc, AHInc, and AHExp decrease and the rest of measures only with really small increase. This can be attributed to delayed impact of crisis on households. Generally we

can say that equivalised income or expenditures did not rise on average between the years 2009 and 2011 and for some measures it even decreased.

From Table 6.1, we can also see that benefit gain from housing equivalised for household size was steady on average with ranges between 900 and 1200 equivalised CZK per consumer unit. Median showed a little bit higher difference between broad income and net income, and between consumption and net expenditures. We could also notice that housing costs on average represent roughly 1700 equivalised CZK in 2006 and this outlay increases to roughly 2000 equivalised CZK in 2011 according to both differences between net income and after housing costs income, and net expenditures and after housing costs expenditures. Median values for expenditures show similar differences and the same trend and median values of income show the same trend with slightly lower housing costs detected in median households. We can conclude that median person according to income pays less for housing costs than median person according to expenditures.

Deciles of various measures

More detailed view on inequality is in Table A.2 containing means for all deciles according to all measures of income and expenditures. It shows period of growth for years 2006-2009 throughout the society for all measures. We can also notice that the struggle of years 2009-2011 detected from Table 6.1 harms all societal groups in a similar way with one exception. The year 2011 meant the largest harm to the lowest decile group by percentages for all measures and by nominal values for almost all measures. This finding is alarming since it means that the combined effect of delayed impact of crisis and the partial end of the deregulation process had the largest impact on the low income and expenditures individuals. We can see that by year 2011, equivalised values for 1st decile were lower than in 2006 for all measures with two exceptions of BInc and NetInc. For 1st decile in these measures drop of 2011 meant return to values between 2006 and 2007.

Table A.2 here

Generally, we can say that people in the lower half of distribution according to expenditure concepts were affected more by the 2011 drop and that the

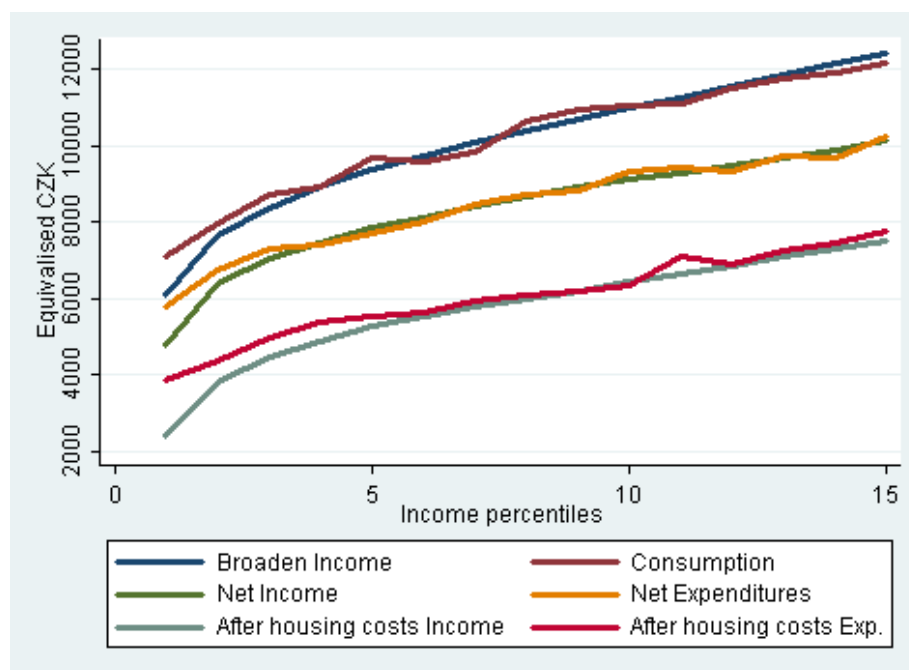
higher half sustained its level of well-being according to monetary expenditures measures with exception of the highest decile group whose expenditures rose. Income measures say a little different story where the impact was more equally distributed among the deciles. This information is in accordance with findings of increase in the poverty in 2011 in the Chapter 5.

Low income percentiles and expenditure ‘tick’

Brewer and O’Dea (2012) and Brewer, Goodman and Leicester (2006) refer to the ‘tick’ phenomenon of larger expenditures of the lowest percentiles according to income measure equal to expenditures of much higher income percentiles. Figure 6.1 below shows the lowest 15 percentiles of all equivalised income measures for all years and mean for each percentile. It also shows mean of equivalised expenditures for percentiles according to related income measures (e.g. BInc percentiles for Con, NetInc percentiles for NetExp, and AHInc percentiles for AHExp measure). Therefore, there are income percentiles for each measure on x axis and values of related income and related expenditures on y axis or in other words it shows mean of income and mean of expenditures by income percentiles.

I show only the lowest 15 percentiles for better illustration of the bottom. The rest of distributions showed increased difference between income and expenditures the larger percentile it was. It can relate to larger saving rates for wealthier people as Crossley and O’Dea (2010) illustrate on the GB data. Situation in the lowest 15 percentiles is different. We can notice that in most cases expenditures are higher than their related income measure. According to Brewer and O’Dea (2012), this difference can be caused by under-recorded income, over-recorded spending, or consumption smoothing. I did not find any ‘tick’ as Brewer, Goodman and Leicester (2006) and Brewer and O’Dea (2012) did. Expenses for households in the lowest percentiles of income measures are on average the lowest as well in the HBS data even though expenses are the most above the related income for the 1st percentile of income distribution. Figure 6.1 proves that both income and expenditures relate to each other and both are relevant in case of measuring poverty and inequality, but we should remember that this figure shows only mean of each income percentile and a particular household can be in a different expenditures percentile.

Figure 6.1: Averages of income and related expenditures for the lowest 15 percentiles of equivalised income measures



Author's computation using the HBS 2006-2011.

6.2 The overall inequality measured by coefficients

For the long history inequality has been examined, various coefficients containing information about inequality were invented to capture inequality in one number. I will use five coefficients in this thesis: Gini coefficient, 10/50, 90/50, and 90/10 ratios together with Theil index.

Description of the Gini coefficient

According to Foster (1985), the Gini coefficient is the most widely used measure of inequality. This coefficient takes into account incomes or expenditures at all points in the scale of a chosen measure. It includes in the equation all individuals and the output testify about the overall inequality.

As Goodman and Oldfield (2004) point out, “*the Gini coefficient benefits from an intuitive geometric interpretation in the form of Lorenz curve.*” Lorenz curve can be seen in Figure 6.2 below.

The horizontal axis p corresponds to the cumulative share of population sorted

Figure 6.2: Lorenz curve

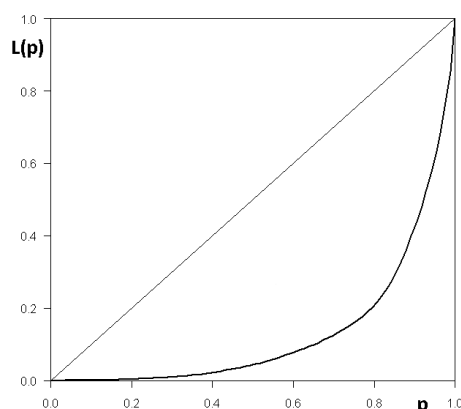


Figure shows simply how the Lorenz curve looks like

by income or expenditures in the ascending order. The vertical axis $L(p)$ shows the cumulative share of income or expenditures. The Lorenz curve then shows how the used measure is distributed among the people. A society with equally distributed measure with everybody having the same would be diagonal. Any other society will have curve below the diagonal. Points on the Lorenz curve show the cumulative wealth of the poorer than in the last considered. Consider illustrative Figure 6.2 and point with coordinates $[0.8; 0.2]$. This point tells us that the poorer 80% of population own 20% of the overall wealth (earn 20% of overall income, spend 20% of total expenditures) and the wealthiest 20% own, earn, spend the rest 80%. The Gini coefficient is then computed as the area above the Lorenz curve and below the diagonal divided by the area of the triangle below the diagonal. The Gini coefficient would equal 0 in completely equal distribution and 1 in the distribution where one individual would own everything.

Description of the 90/10, 10/50, and 90/50 ratios

These ratios work as simply as they look. The 90/10 ratio is income or expenditure of the 90th percentile divided by income or expenditures of the 10th percentile. Same rule apply for 10/50, and 90/50 ratios. As Goodman and Oldfield (2004) mention, these measures have drawback of not taking in account the highest and the lowest 10% of the distribution by comparing a typical individual near the top with a typical individual near the bottom. This measure would not capture inequality where say the top 3% would have more than half of income/expenditures with others having the same. This measure would

not capture inequality also in the society where would be the lowest 9 percent discriminated with others having same income or expenditures.

The description of the Theil index

The Theil index is a statistic measuring inequality. It is a special case of the generalized entropy index and its concept is drawn from information theory, concretely the concept of redundancy Foster (1985). Theil index can be viewed as a index measuring lack of diversity. Foster (1985) explains that it has the highest value when all events occurs with the same probability and the lowest value when one event occurs surely. The equation of Theil index is as follows:

$$T_w = \sum_{i=1}^n \left(\left(\frac{1}{n} \right) \left(\frac{y_i}{\mu_y} \right) \log \left(\frac{y_i}{\mu_y} \right) \right)$$

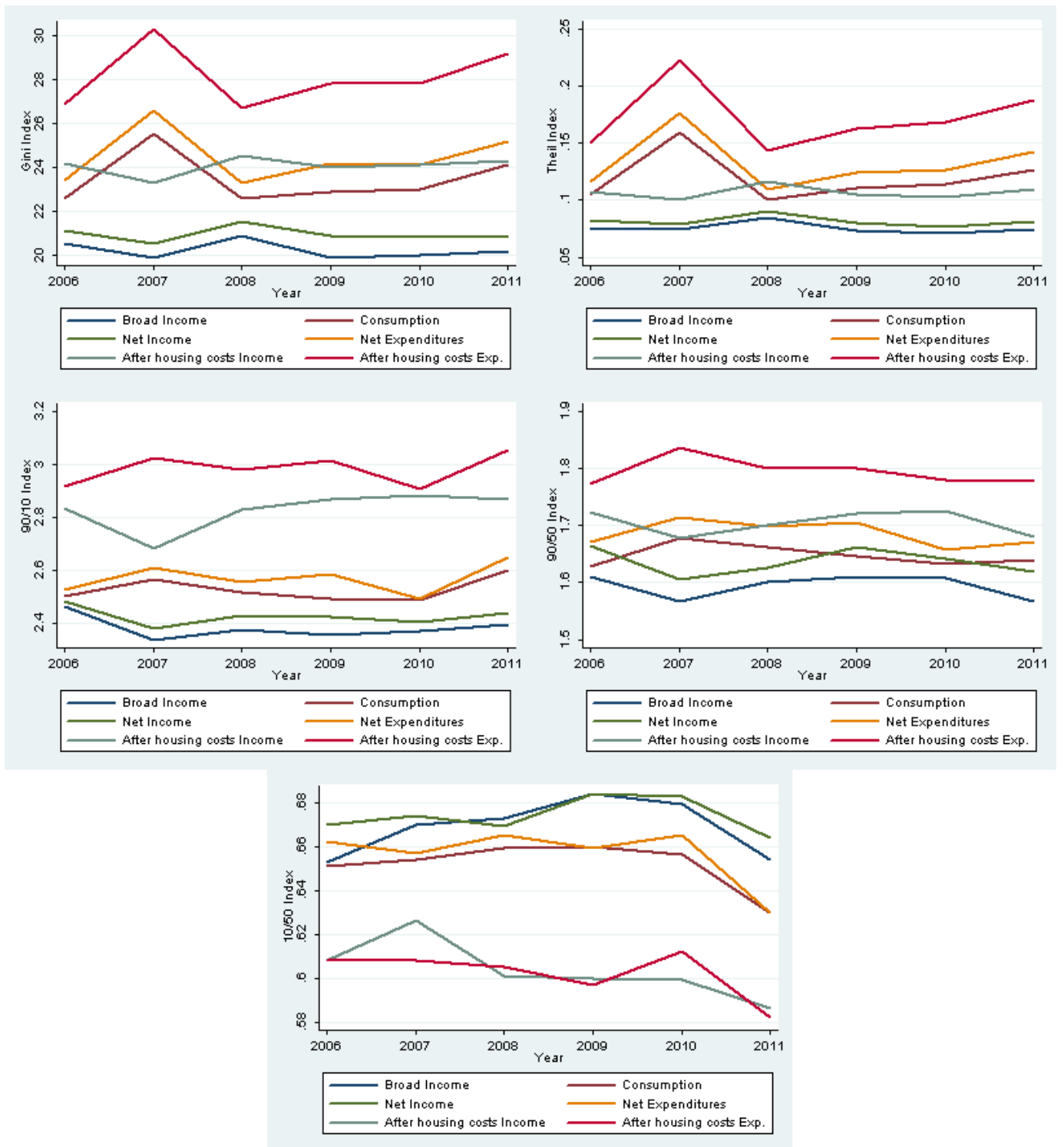
where y_i is income/expenditures of person i sorted by income/expenditures from the lowest to the highest, μ is mean value of income/expenditures and n is a total population.

Inequality coefficients for the Czech population

I applied the indices explained above to the distribution of 3 measures of equivalised income (BInc, NetInc, AHInc), and 3 measures of equivalised expenditures (Con, NetExp, AHExp). Figure 6.3 below shows the results for the Czech population.

As regards the Gini coefficient, we can notice that for both income and expenditures the most equally distributed is the concept with imputed rent, then net measures and the most unevenly distributed is the concept with deducted housing costs. It is also true that for all concepts, the inequality is higher for expenditures. The difference is ranging from 0.015 to 0.05. It is also true that we cannot see any pattern in the Gini coefficient of all concepts of income whilst all expenditures tell the same story of increased inequality by approximately 2 points. This is one of the good examples that choice of a measure matters. For the BInc and NetInc, the Gini coefficient is around 20 for all years. AHInc measure has approximately 24 for all years. Measures of expenditures rose. Consumption rose from 22.6 by 1.5 between 2006 and 2011, NetExp from 23.4 by 1.8, and AHExp from 26.9 by 2.3 with the highest increase between 2010 and

Figure 6.3: Inequality Indices



Author's computation using the HBS 2006-11

2011.

There is one additional pattern in the Gini coefficients. For all measures of expenditures the Gini coefficients jumped by 3 points above in 2007 and then it returned back. This pattern is not occurring in income. Moreover, we can see that income dropped in 2007 by 0.6, 0.8, and 0.9 (BInc, NetInc, AHInc) point and then returned. This pattern is visible in Theil index, too: for expenditures higher and for income measures slightly lower. Since author is not aware of any change in society with so big impact, one can think of a slightly different type of sample in this year and that the difference has inception in the dataset. The Lorenz curve showed greater bunch of individuals with low expenditures in 2007. The problem is occurring in all 3 concepts of expenses. This implies that it was not made by process of imputing rent or deducting housing costs. I will assume that this is a distortion in the data.

As regarding the Theil index, it shows also that inequality measured by different concepts of expenditures is higher than by income in same order. Values for the Theil index are ordered from the lowest as BInc, NetInc, AHInc, Con, NetExp, and AHExp. For the Theil index apply the increase in measures of expenditures over the monitored period with the highest increase in 2011 as well as for the Gini index. This increase is not observed in measures of income.

Percentiles ratios 90/10, 90/50, and 10/50 improve the knowledge of inequality among percentiles over the years according to all measures. Firstly, we can notice that 10/50 ratio remains approximately the same for all years for all measures. However, this is not the same for 90/50 and 90/10. These two measures are almost the same for BInc and NetInc. BInc is only slightly lower. AHInc is higher compared to these two. Compared to income, measures of expenditures are slightly higher and with the same differences between each other. Con is slightly lower than NetExp and AHExp is higher than the rest.

Summary

The overall view on these coefficients says that imputed rent is relatively equally distributed whilst deducting of housing costs affects lower percentiles more. It is also important to realize that the differences among concepts and measures are quite high and can tell different stories. I found increase in inequality over

the monitored period only in measures of expenditures. I also found that not accounting for housing affects inequality a lot. My findings regarding imputed rent are as follows: measures with imputed rent have lower inequality compared to net measures. This information can be considered as good news because we assume that broad income and consumption measures are closer to an individual well-being than net income and net expenditures. Compared to findings of Brewer and O’Dea (2012) for Great Britain, findings in this thesis on the overall inequality in the Czech Republic testify about lower inequality. Moreover, the overall inequality seems to be quite low compared to other countries for all measures with exception of after housing costs expenditures.

6.3 Composition of various deciles

In sections above, I studied the overall inequality. Now we will have a look on composition of various deciles according to various characteristics.

Proportion of education groups across deciles

The HBS provides information about education of the head of a household in several categories. These categories slightly change in 2008 and 2010 so they do not offer coherent view. I prepared 3 categories based on the data provided in the HBS: Primary: absolved from 5 to 9 years of Primary school (changed through the time); Secondary: absolved additional education to primary school but below college; Higher: absolved higher vocational school, college, or university. Table A.3 shows the distribution of various education groups among deciles of all six measures and the total share of education groups in the Czech population.

Table A.3 here

We can see that between measures there are only small differences. The pattern is obvious. The largest share of the primary education group is in the 1st decile and this share decreases more, the wealthier the decile is. For people living in a household led by a head with secondary education, share remains stable for all deciles with exception of the last three deciles where the share is decreasing. People living in households led by a head with higher education have the opposite pattern compared to the primary education group having the

lowest share in the lowest decile and then increases steadily till the wealthiest decile.

The primary education group has larger share than in the overall population in the first 4 to 6 deciles depending on the measure. The secondary education group is distributed evenly with decrease in the highest decile and the higher education group is in the larger proportion than in the whole population in 7th and wealthier deciles. We can conclude that this finding testify about clear benefits from the education on wealth.

Proportion of age groups across deciles

This section is dedicated to analysis of age groups and its shares across various deciles of equivalised income/expenditure. Table A.4 below shows the share of households according to age of a head of a household on all households assigned to the same decile according to equivalised income/expenditures.

Table A.4 here

As we can see, there are large differences between measures. For age group 18-40, we can see that BInc and Con attribute lower deciles compared to the other measures. Households led by head of this group are considered wealthier according to NetInc and NetExp. Compared to the rest of measures they are the most favourable distribution according to AHInc and AHExp measures. The hypothesis that I already stated in Chapter 4 is that this group did manage to accumulate wealth to establish imputed rent benefit from housing as well as to find housing with equally small housing costs as the rest of age groups. Thus when measured without housing costs, 18-40 aged households are considered wealthier compared to others. However, we can see that this pattern is getting smaller, the wealthier the household is.

As regards age group 40-65, the highest 3 deciles look similar for all income concepts and for all expenditure concepts the share in these deciles is lower but still similar among expenditure concepts. The middle deciles do not say clear story for this group. The lowest decile shows the same story as age group of 18-40 with share higher according to BInc compared to NetInc and NetInc higher compared to AHInc. The same applies for expenditure concepts but with lower

values. We can hypothesize about group of poor households from this age group which did not secure themselves with a proper housing and share the place within the poorest decile with households from age group 18-40.

Households led by a head in age group 65+ are considered the wealthiest according to measures with imputed rent (BInc, Con) compared to other measures. The effects of different measures are obvious. When accounted for imputed rent from housing, age groups 65+ do not compose the lowest decile much. The whole distribution of households aged 65+ is moved to the wealthier deciles with stack in 2nd to 6th decile. This age group is less often in higher deciles. For NetInc and NetExp, the lowest decile consists more households aged 65+. For these measures, households aged 65+ are considered poorer than for BInc and Con. These households are less frequently in the highest deciles as well. In fact, the proportion of 5th to 10th decile is lower than for BInc and NetExp. The highest shares in low deciles can be seen for AHInc and AHExp measures. For these measures, households of this group are less frequently in the highest deciles as well. Lower values compared to NetInc begin in 3rd decile and compared to NetExp in 5th decile. In addition, we can see that group of households led by head of a household aged 65+ is in larger proportion in the high deciles according to expenditures measure in comparison with related income measures. As we could see in Chapter 4, households aged 65+ have the highest imputed rent on average. This fact pushes the distribution of households aged 65+ to wealthier deciles of the distribution of the whole population. This is in accordance with the hypothesis that this group managed already to establish a proper housing during their life.

6.4 Expenditure categories and living standards

This section shows expenditures of households (NetExp) in more detail trying to capture patterns across the population. Table A.5 shows different categories of expenditures and their proportion on total expenditures of household throughout the monitored period.

Table A.5 here

We can notice that the biggest change happened in share of category food and beverages which dropped between 2008 and 2009 and then remained the

same and the change in share of category housing, water, etc. The drop in the first category can be explained by impact of crisis and the increase in the housing category relates with a high probability to the deregulation process.

Table A.6 shows share of expenditures on total expenditures for households assigned to various deciles of equivalised net expenditures.

Table A.6 here

Visible patterns are:

- Decreasing share of food category and housing category, the wealthier the household is
- Increasing share of household equipment and maintenance category and transport category, the wealthier the household is
- Slightly lower share of communication category on total expenditures for rich households
- Higher share of recreation and culture category for rich households
- Peak from the rest for the richest decile group share of non-consumption expenditures including purchase of house, purchase of securities etc.

Brewer and O’Dea (2012) examine budget share of ‘best three’. I made similar description statistics including food and beverages category, housing category and transport category in ‘best three’. Table A.7 shows the result for all monitored years by decile group of equivalised net expenditures.

Table A.7 here

We can see that the wealthier the household the lower ‘best three’ share for all years. There is also pattern across the monitored period. The ‘best three’ share increased for almost all deciles and particularly between 2010 and 2011. This increase was caused mainly by housing as you could see in Table A.5. I will look on housing in the further section in more detail.

6.5 Effects of deregulation process

Deregulation process was probably a policy change with the largest impact during the monitored years. It affected regulated rent tenants as well as the rest of households by caused change in prices of housing (Tsharakyan and Zemčik, 2011). As explained in Chapter 2, it was a phenomenon affecting households through all income and expenditures groups. Especially, the partial end in the end of 2010 affected the Czech households a lot. I showed what happened in this year to imputed rent, how poverty and inequality was affected. In the following few tables, I will look in more detail on housing costs, tenure types and especially regulated rent tenants.

Next table, Table 6.2, shows housing costs solely for all monitored years by decile group of equivalised net expenditures.

Table 6.2: Budget share of housing expenditure by decile group of NetExp and years

Year	1	2	3	4	5	6	7	8	9	10
2006	0.275	0.243	0.253	0.231	0.226	0.221	0.214	0.195	0.181	0.145
2007	0.272	0.243	0.240	0.225	0.210	0.206	0.200	0.196	0.171	0.135
2008	0.280	0.257	0.241	0.217	0.209	0.210	0.205	0.192	0.180	0.144
2009	0.288	0.261	0.251	0.242	0.232	0.226	0.218	0.207	0.202	0.153
2010	0.283	0.263	0.254	0.256	0.246	0.229	0.233	0.214	0.205	0.155
2011	0.295	0.261	0.264	0.247	0.261	0.238	0.228	0.226	0.212	0.161

Author's computation using the HBS 2006-2011.

Table 6.2 exemplifies the increase in the housing costs during the deregulation period. We can see that this process affected all decile groups by equivalised net expenditures. The effect was dispersed to more years but the main increase in budget share of housing came with partial end of the deregulation period between 2010 and 2011.

In the next Table 6.3, I divided all households by tenure type and showed how a share of housing costs on total expenditures developed throughout the monitored period.

We can see that all tenure types had to deal with an increase in a share of housing costs. The highest share is for regulated rent tenants followed by private

Table 6.3: Budget share of housing expenditure by tenure type and years

Tenure type	2006	2007	2008	2009	2010	2011
Private rent	0.263	0.253	0.263	0.280	0.305	0.314
Regulated rent	0.264	0.264	0.275	0.298	0.316	0.352
Cooperative apartment	0.239	0.234	0.234	0.244	0.256	0.262
Own outright apartment	0.229	0.224	0.224	0.233	0.240	0.248
Own outright house	0.187	0.171	0.177	0.195	0.191	0.192
Rent free	0.129	0.129	0.127	0.142	0.152	0.151

Author's computation using the HBS 2006-2011.

rent tenants. This makes sense since these two tenure types have to pay rent in addition to the other tenure types. However, it is surprising that regulated rent tenants spend larger share of their total expenditures than private rent tenants. This will be studied more in the following tables. The differences between other tenure types may originate from smaller/larger dwellings on average, less/more demanding dwelling, or the difference in the average total expenditures and thus different share of housing costs. Table A.8 shows how large share housing costs in a budget of households having private or regulated rent belonging to different deciles by equivalised net expenditures has. In addition, Table A.8 shows mean of share of expenditures of private and regulated rent tenants on housing also available in Table 6.3.

Table A.8 here

Table A.8 shows that compared to the overall population of households divided into deciles in Table 6.2, regulated rent tenants paid larger share of their expenditures on housing and slightly larger share than private rent tenants. This is valid for all deciles by equivalised net expenditures with exception of 2010 and 2011 for the lowest two deciles. In these two years and 2 deciles, housing for private rent tenants represented higher share of total budget than for regulated rent tenants. This can be explained by moving of households from the regulated rent tenure type to other tenure types. This process was studied by Tsharkyan and Zemčik (2011).

Moreover, the difference between shares of housing for regulated rent tenants and the overall population increased over the monitored period. One can think of effect of deregulation process on housing costs. This is undoubtedly true

but the increase in housing costs over the monitored period is also affected by increase in other housing costs. According to price indexes from the CZSO, the overall price level rose by 16.2% between 2005 and 2011 whilst housing, water, energy, and fuel costs price level rose by 32.4% between years 2005 and 2011.

In addition, we have to take into account that regulated rent tenants were poorer on average than rest of the Czech population as shown by Table 5.3. However, this difference is not as large as one would expect from the social benefit tenure type. It has one simple reason: regulated rent apartments were assigned 30 years ago, so in many cases social status and income of regulated rent tenants had significantly changed as noted by Lux, Sunega, Kostelecký and Čermák (2003). Poorer regulated tenants on average would imply higher share of housing costs for regulated rent tenants compared to private rent tenants. In addition, housing costs of regulated rent tenants are not as high as for private rent tenants according to my findings about net IR, but housing costs of regulated rent tenants are higher on average than for the rest of households. These two reasons would lead to justification of higher housing costs of regulated rent tenants. The following table, Table 6.4 shows proportion of households with regulated rent in all 10 deciles by all 6 measures of equivalised income or expenditures.

As we can see, all measures show increased shares of regulated rent tenants in the lowest deciles. This also explains the highest average share of housing costs on total expenditures. As regards different measures, BInc and Con show for the lowest deciles that regulated rent tenants did not have such a large net IR as the rest of tenure types and therefore they descend in the distribution of households to lower deciles compared to net measures. Since housing costs represent larger share of total expenditures for regulated rent tenants, AHInc and AHExp measures show regulated rent tenants distributed lower compared to net measures as well.

From the empirical results, we can see that Lux, Sunega, Kostelecký and Čermák (2003) were right about regulated rent tenants distributed in all income/expenditures groups. However, it is also true that there is higher share of regulated rent households in low decile groups. In spite of that, it does not justify regulated rent tenure type in this form when not a small share of rich tenants gets benefits at the expense of owners, too. Moreover, regulated rent

Table 6.4: Share of regulated rent households on decile groups by different measures, all years

Years	1	2	3	4	5	6	7	8	9	10
BInc - Broad income										
2006	0.206	0.212	0.213	0.149	0.212	0.157	0.156	0.117	0.181	0.174
2007	0.221	0.232	0.180	0.167	0.177	0.140	0.165	0.127	0.168	0.153
2008	0.271	0.201	0.166	0.159	0.148	0.140	0.137	0.149	0.132	0.142
2009	0.239	0.194	0.180	0.100	0.130	0.136	0.116	0.157	0.139	0.124
2010	0.227	0.184	0.145	0.157	0.103	0.097	0.110	0.139	0.095	0.112
2011	0.063	0.062	0.059	0.066	0.060	0.032	0.068	0.062	0.042	0.052
NetInc - Net income										
2006	0.180	0.217	0.179	0.174	0.154	0.171	0.202	0.155	0.167	0.175
2007	0.196	0.199	0.202	0.115	0.182	0.166	0.178	0.169	0.143	0.169
2008	0.222	0.175	0.167	0.144	0.127	0.166	0.182	0.154	0.134	0.158
2009	0.192	0.141	0.149	0.135	0.138	0.130	0.172	0.146	0.151	0.145
2010	0.128	0.171	0.147	0.142	0.119	0.119	0.143	0.106	0.138	0.129
2011	0.033	0.073	0.062	0.042	0.067	0.051	0.055	0.062	0.057	0.055
AHInc - After housing costs income										
2006	0.249	0.229	0.191	0.157	0.133	0.190	0.156	0.133	0.172	0.140
2007	0.272	0.211	0.204	0.131	0.131	0.165	0.148	0.155	0.131	0.142
2008	0.296	0.216	0.172	0.100	0.104	0.180	0.129	0.144	0.130	0.123
2009	0.277	0.176	0.117	0.143	0.137	0.115	0.145	0.119	0.127	0.113
2010	0.235	0.211	0.125	0.136	0.091	0.111	0.099	0.096	0.089	0.117
2011	0.113	0.084	0.081	0.027	0.042	0.052	0.049	0.035	0.024	0.045
Con - Consumption										
2006	0.202	0.190	0.176	0.196	0.206	0.157	0.152	0.175	0.153	0.176
2007	0.216	0.218	0.171	0.175	0.195	0.185	0.133	0.128	0.154	0.159
2008	0.231	0.196	0.180	0.157	0.201	0.143	0.116	0.141	0.135	0.155
2009	0.205	0.165	0.144	0.169	0.158	0.135	0.126	0.134	0.149	0.130
2010	0.194	0.135	0.168	0.127	0.174	0.127	0.109	0.084	0.106	0.147
2011	0.038	0.049	0.069	0.039	0.068	0.045	0.073	0.050	0.047	0.076
NetExp - Net expenditures										
2006	0.174	0.165	0.183	0.178	0.193	0.179	0.177	0.187	0.158	0.178
2007	0.174	0.171	0.165	0.228	0.157	0.198	0.162	0.162	0.138	0.166
2008	0.182	0.166	0.184	0.164	0.127	0.178	0.162	0.159	0.142	0.167
2009	0.156	0.122	0.135	0.116	0.183	0.168	0.158	0.146	0.163	0.150
2010	0.133	0.114	0.124	0.145	0.136	0.146	0.113	0.139	0.116	0.175
2011	0.042	0.029	0.050	0.045	0.071	0.047	0.041	0.069	0.067	0.088
AHExp - After housing expenditures										
2006	0.247	0.206	0.193	0.181	0.182	0.169	0.139	0.141	0.149	0.154
2007	0.271	0.204	0.182	0.185	0.169	0.164	0.137	0.117	0.137	0.136
2008	0.309	0.152	0.181	0.174	0.133	0.148	0.143	0.104	0.118	0.149
2009	0.271	0.156	0.138	0.124	0.156	0.161	0.113	0.123	0.108	0.136
2010	0.235	0.181	0.145	0.091	0.122	0.155	0.091	0.099	0.083	0.138
2011	0.096	0.093	0.068	0.033	0.039	0.049	0.049	0.029	0.033	0.071

Author's computation using the HBS 2006-2011.

tenancy distorts rental market as stated by Sunega (2002). From empirical evidence provided in this thesis, we can conclude that regulated rent tenancy is truly not ideal social policy because it does not aim only poor people and as explained in Chapter 2, regulated rent tenancy has other drawbacks as well.

One can dispute whether partial end of deregulation process triggered by amendment extending duration of deregulation process for large cities (as explained in Chapter 2) was right thing to do. In the light of new information about distribution of regulated rent tenants, this amendment looks controversial. Paradoxically, for majority of measures the proportion of regulated rent tenants was slightly higher in the highest decile group than in lower deciles. This paradox gained in strength in second half of the monitored period and especially in year 2011. This means that although the amendment should help the low income/expenditures there was large share of households having regulated rent and not being in need of this amendment. Only for 3 out of 6 measures, there was larger proportion of regulated rent tenants in the lowest decile group than in the highest decile group in 2011. This led to a conclusion that the amendment was not targeted correctly and it did not help low income/expenses households. It also enabled quite large share of high income/expenses households to continue in getting benefits from regulated rent tenancy.

Analysis of deregulation process and its amendment is worth further study enlarged in scope as well as in time horizon to take into account at least 2012 - the last year of regulated apartments. Any additional year would improve analysis as well because trends and patterns would be comparable with period without regulated rent tenure type.

Chapter 7

Conclusion

This thesis has set out the reasons why it is important to measure living standards and poverty by expenditures as a complement to income. Even more importantly, this thesis showed that it really matters how housing costs are accounted for. Narrow approach of only one concept of income is used the most often in measuring living standards and poverty. Both theoretical background and empirical evidence showed that different concepts as well as measuring poverty and inequality from expenditures point of view provide additional valuable information on this topic.

The Household Budget Survey dataset for years 2006-2011 collected by the Czech Statistical Office was used in this thesis. It allowed me to perform analysis of living standards and poverty based on both income and expenditures.

The analysis was performed based on different concepts of income and expenditures. Differences were in the method of accounting for housing. I dedicated whole chapter to estimating consumption flow from housing for tenants not paying market rent. This approach has not been applied previously on the dataset of the Czech households and therefore it deserved much more attention than other concepts. Three concepts of income and expenditures were used for the analysis. The first income and expenditures concept was with imputed consumption flow from housing instead of real housing costs. The second concept used real housing costs and the last concept of income and expenditures was without housing costs at all to account for different tenure types which affect expenditures to large extent.

This thesis provides several interesting findings. When estimating the imputed gross rent, I showed that there are huge differences among regions with Prague as the most expensive region followed by Hradec Kralove and Zlin Region. The lowest imputed consumption flow from housing was found in the Highlands. I also found that the older the household is, the larger is the non-paid benefit from housing. Households with mortgage do pay more than comparable households paying market rent. Both these findings prove that housing is seen as a form of a life-time investment.

When analysing poverty, it was shown that concepts of expenditures indicate similar poverty rates as related concepts of income. However, people considered poor by income were often not considered poor by expenditures. In addition, there were large differences among different concepts with the highest indicated poverty for both income and expenditures after housing costs were deducted. Therefore, it is important which concept is applied. In spite of differences, a persistent pattern in all concepts was identified. Poverty rate registered steep increase for all measures in 2011 ranging from 1% to 2.6%. It was also showed that although forming around one quarter of the whole population, the most endangered age group are children reaching almost 50% of population below poverty line. This relates to the fact that the most endangered household type compared to the proportion in the whole population is lone parent with children.

As regards inequality, comparison of different concepts of income and expenditures showed huge differences. Income and expenditures with imputed rent from housing were the most equally distributed and both measures with deducted housing costs showed the highest inequality. For all concepts, higher inequality for expenditures compared to related income was found. All concepts of expenditures show slight increase in inequality over the monitored years, even though income measures do not show similar pattern at all.

I proved benefits of education on living standards. Another finding showed that there are large differences in measured poverty of old households based on chosen concept.

My analysis about the budget shares of different expenditures showed that the share of housing costs increased over the monitored period. I also analysed

how shares of different expenditures differ by living standards and that poorer households have spent larger share of their budget on basic needs.

Last but not least, the impact of deregulation process on regulated rent tenants was studied. I focused especially on partial end of deregulation process by the end of 2010. Regulated rent tenants were spread across living standards distribution almost uniformly and that the amendment extending deregulation process in large towns to the 2012 from the original 2010 allowed not small share of wealthy households to continue in gaining benefits from regulated rent tenancy although they did not need it. The amendment was meant to reduce the impact of higher rental prices on living standards of regulated rent tenants in large towns in the first place. However, not all regulated rent tenants were in need of benefit from preferential regulated rent. All these arguments led to conclusion that the amendment could be set differently to help households with low living standards more accurately. I also found relatively large increase in the average budget share of housing costs over the monitored period with the largest increase between 2010 and 2011.

Based on my findings, the delayed exposure of crisis combined with effect of deregulation process is the most probable explanation of the poverty and inequality increase over the monitored period.

As for further research, the deregulation process and its impact on living standards would be worth further study enlarged in scope as well as in time horizon to take into account at least the whole deregulation period. As regards imputing of consumption flow from housing, this method added valuable information to the analysis of poverty and inequality. Therefore, I recommend including this method in the further research on topic of living standards of the Czech households. In my opinion, expenditures should not be neglected in the further research on poverty and living standards since it proved to be a source of valuable information telling different story than income.

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Appendix A

Supplementary tables

Table A.1: Proportion of households below/above poverty line owning durable good by different measures

	BInc		NetInc		AHInc		Con		NetExp		AHExp	
	low	notlow	low	notlow	low	notlow	low	notlow	low	notlow	low	notlow
Microwave	0.744	0.766	0.713	0.768	0.631	0.783	0.757	0.765	0.726	0.767	0.652	0.779
Car	0.338	0.646	0.285	0.650	0.247	0.680	0.389	0.643	0.335	0.648	0.242	0.678
PC	0.549	0.551	0.474	0.555	0.359	0.576	0.539	0.551	0.457	0.556	0.351	0.575
Internet	0.336	0.412	0.294	0.415	0.221	0.433	0.370	0.411	0.288	0.416	0.225	0.431
TV	0.984	0.992	0.985	0.992	0.982	0.993	0.992	0.992	0.987	0.992	0.984	0.993
Wsh.Mch.	0.902	0.930	0.853	0.933	0.829	0.942	0.919	0.929	0.857	0.933	0.825	0.941
Dishwash.	0.128	0.225	0.124	0.226	0.081	0.238	0.111	0.226	0.112	0.227	0.076	0.238
Drying Mch.	0.020	0.020	0.015	0.021	0.011	0.022	0.006	0.021	0.006	0.021	0.005	0.022

Author's computation using the HBS 2006-2011.

Table A.2: Decile averages of measures for the Czech population, all years

Year	1	2	3	4	5	6	7	8	9	10
BIInc - Broad income										
2006	6586.0	8467.5	9508.8	10411.8	11343.1	12268.9	13384.7	14958.6	17255.0	24307.5
2007	6982.9	8963.5	10059.9	10930.2	11871.7	12840.1	14039.6	15576.2	17823.6	24968.2
2008	6892.9	9002.7	10082.7	11014.9	11920.1	12899.6	14144.5	15761.0	18241.1	26369.7
2009	7308.2	9635.1	10736.5	11596.6	12435.9	13435.4	14670.9	16322.7	18969.9	26525.6
2010	7234.3	9646.2	10831.4	11729.7	12550.9	13535.3	14766.9	16420.3	19040.2	26677.1
2011	6782.3	9495.8	10836.0	11733.8	12590.3	13573.6	14741.9	16230.0	18669.1	26515.4
NetInc - Net income										
2006	6050.2	7753.7	8655.8	9413.0	10282.6	11207.6	12356.5	13843.5	16054.1	22881.7
2007	6413.5	8261.0	9168.4	9982.2	10853.5	11843.0	13030.6	14556.2	16678.3	23545.6
2008	6431.3	8385.6	9289.9	10140.5	11000.6	12066.3	13211.6	14865.9	17250.5	25091.2
2009	6588.9	8729.4	9694.6	10454.2	11266.6	12300.7	13558.4	15232.6	17755.3	25000.8
2010	6626.0	8789.3	9799.3	10610.3	11470.5	12375.5	13565.4	15308.0	17814.7	25178.0
2011	6146.1	8709.1	9869.8	10679.0	11407.8	12236.8	13416.0	14961.2	17316.5	24939.0
AHInc - After housing costs income										
2006	4373.4	6075.4	7003.5	7786.5	8642.7	9557.7	10676.7	12121.3	14131.1	20804.3
2007	4696.9	6598.7	7600.1	8395.6	9260.5	10174.9	11403.3	12807.5	14774.8	21513.9
2008	4636.4	6591.7	7631.3	8512.1	9418.1	10343.3	11556.7	13078.8	15328.1	22995.4
2009	4638.6	6754.6	7851.8	8685.3	9579.4	10498.6	11747.7	13245.9	15598.6	22629.4
2010	4638.7	6746.6	7814.3	8734.9	9659.3	10549.1	11721.9	13370.5	15646.0	22909.5
2011	4264.1	6601.9	7767.2	8712.7	9516.0	10395.5	11452.2	12987.4	15169.4	22581.1
Con - Consumption										
2006	6026.0	7565.5	8532.2	9430.8	10266.9	11057.1	12134.2	13480.5	15676.6	25183.7
2007	6156.1	7779.9	8803.0	9704.5	10577.1	11571.0	12629.3	14095.5	16585.8	30622.6
2008	6187.2	7860.2	8882.6	9789.3	10629.8	11479.9	12483.4	13970.0	16447.5	26032.3
2009	6465.3	8157.7	9262.1	10161.1	10997.1	11920.0	12975.6	14404.3	16894.2	27798.2
2010	6405.6	8192.8	9190.7	10070.7	10924.5	11904.0	12978.0	14347.8	16712.9	27749.8
2011	6004.3	8070.6	9190.9	10133.4	11062.6	11995.5	13109.9	14449.9	16807.1	28862.1
NetExp - Net expenditures										
2006	5492.0	6856.7	7707.4	8486.0	9251.7	10000.6	10962.3	12316.9	14438.4	23865.8
2007	5640.7	7074.8	7944.0	8810.8	9569.7	10478.9	11556.2	12964.3	15387.1	29407.8
2008	5742.9	7247.8	8158.9	8952.8	9682.9	10592.4	11583.0	12923.4	15319.4	24932.9
2009	5730.5	7335.7	8262.9	9077.8	9833.2	10735.2	11842.2	13163.6	15543.1	26423.7
2010	5701.6	7355.3	8308.3	9088.4	9840.6	10740.8	11783.8	13121.2	15258.1	26394.2
2011	5374.3	7159.8	8258.3	9077.8	9873.7	10780.7	11768.8	13141.8	15353.5	27403.9
AHExp - After housing costs expenditures										
2006	3951.2	5351.5	6104.2	6817.2	7505.3	8318.2	9229.3	10494.1	12498.0	21817.3
2007	4070.3	5550.1	6379.0	7146.4	7933.7	8796.3	9855.2	11129.6	13456.6	27414.4
2008	4116.5	5606.6	6527.1	7315.4	8058.8	8833.9	9796.9	11058.0	13306.9	22929.8
2009	4016.2	5594.2	6512.8	7272.2	8030.1	8851.6	9865.2	11094.4	13309.5	24069.6
2010	4002.6	5595.2	6466.2	7185.9	7934.3	8793.9	9736.5	11020.7	13080.3	24039.9
2011	3693.3	5389.1	6290.4	7142.6	7908.1	8748.9	9752.7	11012.9	13062.6	24934.7

Author's computation using the HBS 2006-2011.

Table A.3: Share of education group on decile groups by different measures

Education	1	2	3	4	5	6	7	8	9	10	Total
BInc - Broad income											
Primary	0.118	0.115	0.079	0.076	0.078	0.044	0.040	0.037	0.019	0.006	0.059
Secondary	0.845	0.826	0.861	0.846	0.841	0.842	0.820	0.799	0.810	0.736	0.821
Higher	0.038	0.059	0.061	0.078	0.080	0.114	0.140	0.164	0.172	0.257	0.120
NetInc - Net income											
Primary	0.156	0.108	0.092	0.069	0.057	0.033	0.031	0.023	0.019	0.005	0.059
Secondary	0.806	0.836	0.856	0.859	0.844	0.831	0.841	0.802	0.813	0.727	0.821
Higher	0.038	0.056	0.052	0.072	0.099	0.136	0.128	0.175	0.169	0.267	0.120
AHInc - After housing costs income											
Primary	0.137	0.110	0.082	0.084	0.058	0.025	0.024	0.026	0.014	0.007	0.059
Secondary	0.821	0.838	0.853	0.820	0.838	0.867	0.836	0.796	0.816	0.730	0.821
Higher	0.042	0.052	0.065	0.096	0.104	0.108	0.140	0.178	0.169	0.264	0.120
Con - Consumption											
Primary	0.116	0.070	0.089	0.075	0.075	0.061	0.042	0.060	0.018	0.010	0.059
Secondary	0.841	0.868	0.845	0.841	0.837	0.841	0.835	0.781	0.808	0.736	0.821
Higher	0.043	0.062	0.066	0.084	0.089	0.098	0.122	0.159	0.175	0.254	0.120
NetExp - Net expenditures											
Primary	0.136	0.101	0.083	0.058	0.077	0.052	0.038	0.036	0.012	0.012	0.059
Secondary	0.818	0.843	0.848	0.861	0.836	0.838	0.832	0.815	0.793	0.734	0.821
Higher	0.045	0.056	0.069	0.081	0.087	0.109	0.130	0.149	0.195	0.254	0.120
AHExp - After housing costs expenditures											
Primary	0.141	0.094	0.083	0.057	0.068	0.050	0.032	0.028	0.019	0.011	0.059
Secondary	0.815	0.847	0.832	0.860	0.840	0.847	0.837	0.807	0.795	0.733	0.821
Higher	0.044	0.059	0.085	0.083	0.092	0.103	0.131	0.164	0.186	0.256	0.120

Author's computation using the HBS 2006-2011. Education groups are according to education of head of household.

Table A.4: Share of age group on decile groups by different measures

Measures	1	2	3	4	5	6	7	8	9	10
Age 18-40										
BInc	0.391	0.254	0.225	0.218	0.204	0.217	0.227	0.249	0.248	0.242
NetInc	0.342	0.209	0.190	0.204	0.204	0.247	0.280	0.279	0.256	0.254
AHInc	0.252	0.187	0.198	0.220	0.217	0.264	0.314	0.294	0.266	0.260
Con	0.450	0.314	0.266	0.230	0.202	0.187	0.194	0.191	0.212	0.269
NetExp	0.378	0.280	0.243	0.227	0.200	0.211	0.204	0.215	0.227	0.285
AHExp	0.289	0.251	0.227	0.225	0.224	0.240	0.230	0.234	0.237	0.296
Age 40-65										
BInc	0.502	0.406	0.344	0.353	0.415	0.461	0.518	0.609	0.644	0.679
NetInc	0.468	0.393	0.296	0.340	0.443	0.496	0.574	0.597	0.680	0.685
AHInc	0.446	0.365	0.328	0.382	0.447	0.514	0.558	0.605	0.672	0.685
Con	0.462	0.422	0.402	0.411	0.400	0.479	0.499	0.575	0.640	0.627
NetExp	0.428	0.382	0.382	0.397	0.433	0.481	0.531	0.603	0.663	0.641
AHExp	0.411	0.370	0.397	0.389	0.451	0.503	0.565	0.603	0.658	0.638
Age 65+										
BInc	0.107	0.340	0.430	0.429	0.381	0.322	0.255	0.142	0.108	0.079
NetInc	0.189	0.398	0.514	0.457	0.353	0.258	0.146	0.124	0.064	0.062
AHInc	0.302	0.449	0.473	0.398	0.336	0.222	0.129	0.101	0.062	0.056
Con	0.088	0.263	0.332	0.359	0.398	0.334	0.307	0.234	0.148	0.105
NetExp	0.194	0.338	0.375	0.376	0.367	0.308	0.264	0.181	0.110	0.074
AHExp	0.301	0.379	0.376	0.387	0.326	0.257	0.205	0.163	0.105	0.066

Author's computation using the HBS 2006-2011. Age groups are according to age of head of household.

Table A.5: Budget shares of household expenditures by years

Expenditure	2006	2007	2008	2009	2010	2011
Food and beverages	0.225	0.223	0.224	0.214	0.213	0.213
Alcohol, tobacco	0.033	0.033	0.032	0.032	0.031	0.032
Clothing, footwear	0.056	0.055	0.053	0.052	0.051	0.049
Housing, water, electricity, gas and other fuels	0.218	0.209	0.213	0.227	0.232	0.237
Household equipment, routine maintenance	0.064	0.063	0.062	0.060	0.056	0.056
Health	0.022	0.024	0.030	0.029	0.029	0.029
Transport	0.085	0.084	0.085	0.082	0.085	0.087
Communication	0.057	0.057	0.059	0.059	0.059	0.058
Recreation, culture	0.073	0.075	0.076	0.073	0.072	0.069
Education	0.004	0.004	0.005	0.005	0.005	0.005
Restaurants, hotels	0.034	0.036	0.036	0.037	0.034	0.035
Other G&S	0.062	0.062	0.062	0.063	0.064	0.062
Non-consumption exp.	0.066	0.074	0.066	0.068	0.068	0.068

Author's computation using the HBS 2006-2011.

Table A.6: Budget shares of household expenditures by decile groups of NetExp

Expenditure	1	2	3	4	5	6	7	8	9	10
Food and beverages	0.289	0.270	0.254	0.243	0.231	0.220	0.206	0.198	0.171	0.123
Alcohol, tobacco	0.033	0.031	0.032	0.034	0.035	0.034	0.034	0.034	0.030	0.025
Clothing, footwear	0.046	0.049	0.050	0.052	0.052	0.054	0.055	0.058	0.059	0.051
Housing, water, electricity, gas and other fuels	0.281	0.255	0.249	0.237	0.231	0.223	0.214	0.208	0.193	0.149
Household equipment, routine maintenance	0.031	0.042	0.048	0.054	0.060	0.065	0.068	0.070	0.076	0.082
Health	0.025	0.029	0.028	0.030	0.031	0.030	0.028	0.026	0.025	0.021
Transport	0.058	0.062	0.065	0.069	0.071	0.079	0.086	0.094	0.107	0.146
Communication	0.067	0.066	0.063	0.060	0.060	0.060	0.059	0.057	0.053	0.039
Recreation, culture	0.045	0.058	0.062	0.067	0.073	0.077	0.084	0.085	0.096	0.077
Education	0.005	0.004	0.004	0.005	0.004	0.004	0.005	0.004	0.005	0.005
Restaurants, hotels	0.025	0.028	0.029	0.032	0.033	0.038	0.040	0.042	0.044	0.038
Other G&S	0.062	0.061	0.061	0.064	0.064	0.065	0.065	0.068	0.065	0.053
Non-consumption exp.	0.033	0.046	0.054	0.053	0.054	0.050	0.056	0.056	0.076	0.191

Author's computation using the HBS 2006-2011.

Table A.7: Budget share of ‘best three’ by decile groups of NetExp and years

Year	1	2	3	4	5	6	7	8	9	10
2006	0.629	0.578	0.576	0.555	0.532	0.523	0.517	0.487	0.472	0.428
2007	0.621	0.575	0.565	0.539	0.518	0.512	0.501	0.492	0.451	0.397
2008	0.628	0.590	0.558	0.537	0.528	0.512	0.493	0.487	0.470	0.421
2009	0.621	0.578	0.567	0.547	0.526	0.527	0.506	0.496	0.467	0.415
2010	0.630	0.591	0.568	0.561	0.535	0.529	0.518	0.503	0.477	0.422
2011	0.646	0.599	0.584	0.550	0.556	0.532	0.519	0.509	0.491	0.421

Author’s computation using the HBS 2006-2011.

Table A.8: Budget share of housing expenditures for regulated and private rent tenants by decile groups of NetExp and years

Years	1	2	3	4	5	6	7	8	9	10	Mean
Regulated rent											
2006	0.367	0.302	0.315	0.267	0.259	0.291	0.238	0.229	0.198	0.177	0.264
2007	0.353	0.314	0.342	0.276	0.248	0.243	0.248	0.246	0.204	0.161	0.264
2008	0.368	0.329	0.333	0.282	0.269	0.262	0.240	0.254	0.233	0.169	0.275
2009	0.384	0.362	0.366	0.340	0.292	0.276	0.280	0.293	0.253	0.190	0.298
2010	0.408	0.389	0.366	0.355	0.302	0.310	0.297	0.322	0.288	0.200	0.316
2011	0.422	0.298	0.411	0.358	0.431	0.321	0.353	0.428	0.353	0.201	0.352
Private rent											
2006	0.350	0.225	0.282	0.273	0.251	0.265	0.232	0.307	0.216	0.205	0.263
2007	0.375	0.283	0.345	0.240	0.215	0.245	0.297	0.259	0.196	0.141	0.253
2008	0.339	0.275	0.255	0.195	0.258	0.278	0.293	0.246	0.255	0.205	0.263
2009	0.331	0.351	0.296	0.294	0.351	0.291	0.275	0.193	0.266	0.196	0.280
2010	0.390	0.424	0.278	0.325	0.285	0.322	0.327	0.279	0.292	0.197	0.305
2011	0.429	0.382	0.324	0.324	0.323	0.319	0.298	0.262	0.274	0.182	0.314

Author’s computation using the HBS 2006-2011.

Appendix B

Ramsey RESET Test

My first specification of the model had been that gross rent depends on type of house controlled by dummy variables: Single-family house; Semi-detached, Terrace house; Apartment block; other building. I had controlled for size of the city as well: County Seat and Town. Region of household had been controlled by several other dummy variables. I had controlled for calendar years by dummy variables as well. The last variable controlled had been the number of rooms in a household.

Then I performed Ramsey RESET test. According to Wooldridge (2009) Ramsey RESET test is test of functional form misspecification where the model is tested whether there is any non-linear combination of the fitted values explaining the response variable. This means that it tests whether any non-linear combination of explanatory variables explains the response variable.

Consider model,

$$y = \alpha x$$

The Reset test proceeds by estimating,

$$y = \alpha x + \gamma_1 \hat{y}^2 + \dots + \gamma_{k-1} \hat{y}^k$$

Then I jointly test significance of $\gamma_1, \dots, \gamma_{k-1}$ by F test.

Table B.1: Predicting Housing Expenditures - but omitted variable

Explanatory variables	coefficient	(s.e.)
Single-family house	1586.7***	(368.7)
Semi-detached, Terrace house	605.2	(387.8)
Apartment block	1411.9***	(211.4)
Other building	1130.9***	(418.7)
County seat	1099.0***	(212.9)
Town	896.4***	(170.8)
Prague	3794.0***	(294.3)
Central Bohemian Region	1376.1***	(378.6)
South Bohemian Region	641.1**	(322.8)
Plzen Region	559.9*	(337.9)
Karlovy Vary Region	835.1**	(405.4)
Usti nad Labem Region	805.0***	(266.3)
Liberec Region	962.0***	(303.9)
Hradec Kralove Region	1865.9***	(378.5)
Highlands Region	674.0*	(348.3)
South Moravian Region	505.7	(325.1)
Olomouc Region	751.8**	(375.3)
Zlin Region	1994.3***	(439.0)
Moravian-Silesian Region	1085.9***	(266.8)
No. of rooms	952.8***	(66.72)
Year 2007	38.70	(243.5)
Year 2008	199.7	(247.5)
Year 2009	1073.2***	(242.2)
Year 2010	1210.9***	(230.6)
Year 2011	1478.4***	(210.3)
Intercept	1861.6***	(339.5)
N	1019	
adj. R^2	0.395	

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Author's computation using the HBS 2006-2011 households having unfurnished private market rent tenancy

H_0 : $\gamma_1, \dots, \gamma_{k-1}$ is not significant; Model has no omitted variables

H_a : $\gamma_1, \dots, \gamma_{k-1}$ is significant; Model has omitted variables

The RESET test computed by STATA use only γ_1 , γ_2 , γ_3 , thus the results were:

$$F(3, 990) = 6.20; \text{ Prob} > F = 0.0004$$

Therefore I had to reject the null hypothesis. Then I thought about specification of the model and came up with idea that rooms of the dwelling might affect gross rent differently across regions because there are different rental prices in different regions based on size of the dwelling. Thus, I added to explanatory variables multiple of variable controlling number of rooms and dummy variable for each region. The results of this regression are used in this thesis and are provided in Table 2.

Then I performed RESET test once again with results:

$$F(3, 997) = 2.22; \text{ Prob} > F = 0.0842$$

I could not reject the null hypothesis of no omitted variable on 5% confidence interval so I proceed in the analysis with these results.