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Sharing Economy and Sustainable Development

Bachelor's Thesis

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Declaration

I hereby declare that I am the sole author of this thesis. I have marked out all quotations and acknowledged all the sources of information that have been used in the thesis in the attached references.

In Prague on: Signature:

Acknowledgment

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"Developing an economy that can be sustained indefinitely within the finite biosphere definitively requires new ways of thinking."

– Herman Daly, 2007

Introduction

Sharing economy has emerged in the recent years, encountering a significantly quick growth and becoming a widely discussed topic. Sharing goes back to the history as a basic form of economic behaviour and at the same time it could be a part of a potential life-value change today. Sharing economy has been publicly debated usually in connection with regulation of the sharing economy platforms. However, there are other important and interesting dimensions of this relatively new phenomenon. One of them is the potential relationship between the sharing economy and the sustainable development and growth. The aim of this thesis is to discuss and evaluate the possible impact of the sharing economy on the long-term sustainability from both ecological and economic perspective. The impact is evaluated by both theoretical description in the first part of the thesis and with use of economic models of development and growth in the second part, that will extend and complement the theory.

The first part serves as an introduction into the two topics of research. In chapter 1.1, the concept of the sharing economy is introduced, including its history and the driving forces standing behind the concept. To recognize its significance, the sharing economy is evaluated as for the evolution of market share, the value of transactions and the revenue of the sharing economy platforms. In chapter 1.2, the theory of sustainable development is introduced. The important split between the ecological and neoclassical (standard) view on sustainability needs to be pointed out, as well as the interchangeability of the terms "growth" and "development." The key findings in sustainability from both schools of thought are discussed. In chapter 1.3, the most relevant aspects of the sustainability in the sharing economy are identified to enable its interconnection with the economic models.

The most significant development and growth models have been selected from each school of thought and are presented in chapter 1.4. In the ecological school of thought, the Genuine progress indicator as a metric alternative to GDP is used to measure the sustainability of the economic development. In the neoclassical school of thought, the Solow growth model is used as a measure of the long-run economic growth and the optimal steady state of the economy, based on its Keynesian precursor, the Harrod-Domar growth model.

In the second part, the sharing economy concept is applied to the models with use of the aspects mentioned above. Firstly, in chapter 2.1, the sustainability of the current state of growth of the economy is evaluated. The correlation of GDP as of a standard measure of economic growth with the welfare is evaluated and the importance of optimum scale of the economic growth is introduced. In chapter 2.2, the application of the sharing economy on the models is executed in form of discussion. The reason of this approach is, that the sharing economy as a relatively new phenomenon has no sufficient background data to be used in the models. Moreover, the sources of literature that would interconnect the sharing economy with the models of economic growth and development are rather scarce. The application is therefore a subject of discussion based on the theoretical background to the topics of sharing economy and sustainability. The potential effects of the sharing economy are demonstrated firstly on the Genuine progress indicator, secondly on the Harrod-Domar model and lastly on the Solow model.

Consequently, the topic of regulation of the sharing economy needs to be introduced in chapter 2.3 as a necessary component of both the assumptions of use of the models and as a condition of efficient use of the sharing economy in the real world. Final supplements are debated in the last chapter 2.4, where the key ideas of both schools of thought are revised and the issues connected to the limits of use are touched.

1 Sharing Economy as a Path towards Sustainable Development

Sharing economy is an economic as well as cultural breakthrough of economic behaviour that allows people to share their property, resources, time and skills through online platforms. This can unlock previously unused, or under-utilized assets (Wosskow, 2016) – connecting people who have private excess capacity to those who want to purchase it (Stemler, 2016). It is therefore empowering a new generation of microentrepreneurs (Wosskow, 2016). At the same time, this significant change in the consumers' behaviour can imply a potential new way to sustainability (e.g. Martin, 2016, Stemler, 2016) as the society approach to the ownership is now reinforced to shift from an individual's property of the asset to the individual's access to the asset (Lobel, 2016). In this chapter, the sharing economy concept will be examined closely, followed by the concept of sustainable development in different schools of thought. Consequently, the most relevant aspects of the sharing economy will be selected to enable discussing the interconnection of the sharing economy with the selected models of sustainable growth and development. In the end of this chapter, these economic models will be introduced.

1.1 Sharing Economy

The sharing economy is a relatively new concept and area of the economy. One of the revolutionary ideas in this concept is, that people in the sharing economy can now make use of the assets and skills they already own (Hancock, quoted from Wosskow, 2014).

On the other side, there is the aspect of the sharing itself. History of sharing is very deep. It is said, that sharing is the most universal form of human economic behaviour as it has probably been the most basic form of economic distribution in hominid societies for several hundred thousand years (Price, 1975, quoted from Belk, 2010). Russel Belk (2010) sees sharing as a fundamental consumer behaviour and increasingly vital consumer research topic.

Furthermore, he suggests that sharing out dissolves interpersonal boundaries presented by materialism and possession attachment. Sharing can be defined as a nonreciprocal pro-social behaviour (Benkler, 2004).

Therefore, it would be probably more accurate to differentiate between sharing and reciprocity. Sharing economy as a term has been often contested and disputed and alternative terms such as “peer-to-peer,” “gig” or “on-demand” have been proposed. The European commission has adopted the term “collaborative economy” (Davidson, Infranca, 2016), while Orly Lobel (2016) has proposed the term “platform economy,” suggesting that each of these terms proposed represents an aspect of the digital platform revolution. For purpose of this thesis, these terms will be treated as synonyms, and they will be referred to as “sharing economy.”

In this chapter, different drivers standing behind the sharing economy will be introduced. Moreover, to get more realistic view on this concept, current significance and market share of the sharing economy will be evaluated.

1.1.1 Driving Forces

There are certain aspects that enabled the existence and growth of the new digital platforms and that allowed the sharing economy to operate on a large scale. Abbey Stemler (2016) suggests, that there are three main driving forces behind the sharing economy. It is modern trust, economic and cultural pressures and, probably the most important, technology.

As for the technology, the new start-up platforms vitally rely on and depend on the digital technologies which provide them with important background. While the platforms are operating through connecting people on-line, they are in fact transforming behaviour and relationships offline – outside of the digital world (Lobel, 2016), on a scale that would not be achievable without modern technology. The Internet enables the free flow of information that allows consumer needs to be met by a large cross-section of society. The interconnection of the demand and supply would not be achievable without the digital platform companies, which act as brokers between the transactions (Stemler, 2016).

The new revolutionary idea lies in the critical mass of providers and consumers who are sufficiently close to each other amenities to make the platforms work, often finding value in the fact of beneficial spill-overs from the reciprocal proximity. The sharing economy services and goods are therefore very connected to a specific spot and mutual proximity, offering the so-called "real-world" goods and services, combining different assets and people in a place-based way, which distinguishes them from the earlier generation of technology companies (Davidson, Infranca, 2016). Moreover, the transaction costs have been dramatically reduced as the technology enables the information to be exchanged on-line instantly and with no variable costs. Without the internet technology, it would have been prohibitively expensive and impractical to deal with the individual transactions. The goods and services would not have been available on such a large scale and accessible in such a simple and cheap way. The sharing economy is thus intimately interconnected with digitalisation (Munkøe, 2017).

Another of the so-called "drivers" that stands behind the existence of the sharing economy platforms is the historical background of the period when these platforms started to evolve. Abbey Stemler (2016) highlights the economic and cultural pressures of this period. Many of the platforms were founded in years 2008–2010, right after the outbreak of the global financial crisis. The depressed labour market was a significant precondition for the sharing economy (Kevin Roose, 2014, quoted from Stemler, 2016) as the unemployment was rising and people were forced to take temporary or part-time jobs, which the sharing economy platforms provided (Stemler, 2016).

Lastly, Abbey Stemler (2016) points out the role of the modern trust. The new platforms facilitate behaviour that would have been unthinkable before. This view may seem contradictory to the that of Russel Belk (2010), who states, that the sharing is one of the most fundamental economic behaviour in the long-term period. Based on Stemler (2016) and Belk (2010), it could be implied, that the sharing and role of trust is definitively not a newly developed concept, it is, rather, a return to an older one.

Compared to rather short-term history, people go back to entrusting complete strangers with their most valuable possessions and experience, entering a new era of Internet-enabled intimacy. This economic as well as a cultural breakthrough is enabled by a sophisticated series of mechanisms, algorithms, and user-rating systems of rewards and punishments (Tanz, 2014). To provide a framework to build up trust, the platforms help to exclude untrustworthy counterparties with a dubious track record from the system. Moreover, the intermediation of a neutral third-party platform helps to mitigate the risks and uncertainty concerning economic transactions between the strangers. The platforms can serve as money intermediary as well as a guarantee in case of possible harms and can thus help building the trust, that is essential for sharing economy services to function (Munkøe, 2017).

1.1.2 Current State

The emerging model of the sharing economy has significantly increased especially in the last few years, when it has gone from niche to mainstream. The new platforms have rapidly grown and attracted billion-dollars investment, often exceeding their competitors with "traditional" business concepts (Munkøe, 2017).

According to PWC (2016), there are five key sectors of the sharing economy:

1. Peer-to-peer accommodation: households sharing access to their under-utilized living space in their home usually for short-time period, or renting out holiday houses (Airbnb, Couchsurfing, HomeAway, VRBO),
2. Peer-to-peer transportation: car owners supplying their vehicles as short-term rentals (Getaround, RelayRides), intercity transportation (BlaBlaCar, Carpooling), urban transportation (Uber, Lyft, Sidecar),
3. On-demand household services: access to on-demand support with household tasks (TaskRabbit, Handy, Instacart, Airtasker, Washio),
4. On-demand professional services: freelancer marketplaces with access to on-demand support with professional skills,
5. Collaborative finance: individuals and businesses who invest, lend and borrow directly between each other such as crowd-funding or peer-to-peer lending (Lending Club, Funding Circle, Kickstarter).

However, there are many more examples of platforms, such as peer-to-peer rent of apparel and accessories (StyleLend), shared dining (Kitchit, EatWith, Feastly, Blue Apron, Munchery), local delivery (Instacart, Postmates), office space (Liquid Space, ShareDesk), parking spaces (ParkingPanda, Park Circa), used clothing (ThredUp), household tools (Open Shed), outdoor gear (Gearcommons), broadcasting (Aereo, FilmOn.com), legal services (Upcounsel), medical services (Healthtap, Teledoc, CrowdMed), academic services (Uguru), flower delivery (BloomThat), dog walking (DogVacay) and package delivery (Shyp), that enable individuals to use their excess capacity (Sundararajan, 2015, PWC, 2016, Lobel, 2016).

According to PWC (2016), in 2013, the value of transactions of the 5 key sectors of the sharing economy facilitated 10bn EUR in Europe only. In 2015, 5 key sectors in Europe facilitated 28bn EUR in transaction value, growing by 180 % from 2013.The projected value of transactions in 2025 is 570bn EUR.

The five key sectors in 2015 in Europe according to their transaction value and share on the sharing economy are respectively:

1. Peer-to-peer accommodation (15.1bn EUR; 54 %),
2. Collaborative finance (5.2bn EUR; 18 %),
3. Peer-to-peer transportation (5.1bn EUR, 18 %),
4. On-demand household services (1.95bn EUR, 7 %),
5. On-demand professional services (0.75bn EUR, 3 %).

PWC states that the total platform revenues generated were 3.6bn EUR in 2015 alone, growing by 260 % from 1bn EUR in 2013. The revenues projected by 2025 in Europe are over 80bn EUR.

The five keys sectors in 2015 according to their revenue and share on the sharing economy are respectively:

1. Peer-to-peer transportation (1.65bn EUR; 47 %),
2. Peer-to-peer accommodation (1.15bn EUR; 32 %),
3. On-demand household services (0.45bn EUR; 12 %),
4. Collaborative finance (0.25bn EUR; 7 %),
5. On-demand professional services (0.1bn EUR, 2 %).

On average, over 85 % of the value of transactions facilitated by sharing economy platforms is received by the provider rather than the platform. The revenue models used vary significantly across and within the sectors. Commissions charged vary from 1 % to 2 % in lending services, to up to 20 % in shared transportation. Nevertheless, it is not easy for the platforms to turn the revenues into profits. Profitability has now improved mostly in the mature markets, however, the current investments in customer acquisition will need to pay off in the future if the sharing economy platforms are to prove their long-term sustainability (PWC, 2016).

Over 10,000 new platform companies have sprouted in years 2007–2015, and they continue to pop up daily (Stein, 2015, quoted from Lobel, 2016). As for the most recent data, the sharing economy transactions in five key sectors in Europe are expected to increase yearly by 60 % in 2017 (Vaughan, PWC, 2017). PWC (2016) estimates, that the sharing economy share will rival the size of the "traditional economy" by 2025.

Currently, we can observe a relatively small, but quickly growing participation in the sharing economy. According to the ING International Survey (2015), about a third of people in Europe have heard about the sharing economy in 2015. However, the actual participation in the sharing economy is much lower – about 5 %, resulting in a room to grow as more people are becoming familiar with this concept. About a third of people in Europe think their participation in the sharing economy will increase in the next 12 months. In the USA, about 27 % of people have heard about the sharing economy and 9 % have actually participated.

According to this survey, a typical participant – "a sharer" is a person aged under 35 and well educated. Majority of people participating by providing an asset in the sharing economy earned 1,000 EUR or less in 2015. The average amount was 2,500 EUR and the median 300 EUR, which is probably the most accurate index.

As Pierre Goudin (2016, p.7) put it, *"today, no-one can say with certainty to what extent the sharing economy will change the economic landscape. Yet, the speed, dynamism and scale of the change seem to point to a substantial long-term trend … which can be observed across a wide and increasing variety of markets."*

1.2 Sustainable Development

In this thesis, sustainability from both economic and ecological perspective will be considered, and their interconnection and mutual dependence will be discussed.

"Sustainability refers to:

(a) use of the biosphere by present generations while maintaining its potential yield (benefit) for future generations; and/or
(b) non—declining trends of economic growth and development" (OECD, 2001a).

What exactly should be sustained in the sustainable economy? Five quantity candidates according to Herman Daly (2007) will be discussed throughout this thesis: GDP as measure of growth of the economy, "utility," throughput, natural capital and total capital — the sum of natural and man-made capital.

"Sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (OECD, 2001b) — in contrast with growth, which could be viewed rather as quantitative expansion of the economy, although often used as near synonym in the neoclassical economics (Daly, 2007).

Since about the 1870s, the neoclassical economic school of thought has been regarded as the dominant (or standard) approach to economics (Hussen, 2000), although other schools have been emerging. Over the last ten years, two schools of thought dealing mostly with the relationship between the economics and the environment have been settled; i.e. the ecological economics and the environmental economics. In some respects, environmental and ecological economics are rather similar, however, the ecological economics is more methodologically pluralist – using a variety of methodologies (Tietenberg, Lewis, 2012), and the research is strongly rooted in biophysical and psycho-social reality rather than in an abstract world (Solow, 1993; quoted from Stern, 1996).

On the other hand, environmental economics is based mostly on the standard neoclassical economics. Ecological and environmental scholars can be viewed as competitive or as complementary (Tietenberg, Lewis, 2012).

For purpose of this thesis, sustainability will be examined mainly from the ecological and neoclassical point of view, and these two schools of thought will be compared to see the differences emerging between them. The ecological and environmental economics will be viewed as complementary.

1.2.1 Sustainability in the Ecological Economics

What is being sustained and what is doing the sustaining? In the ecological economics, it is the economy that is being sustained and the biosphere that is doing the sustaining. The biosphere is viewed as the total natural system of biogeochemical cycles. The economy is viewed as its subsystem dominated by transformations of matter and energy to serve human purposes. The problem is, that these transformations interfere considerably with the biosphere, reducing its capacity to sustain the economy. According to the ecological economists, the "sustainable economy" is the economy that can be maintained indefinitely within the finite biosphere. The natural resources should be treated as things and should be consequently measured and inherited (Daly, 2007).

Sustainability defined by the ecological economists, as by one of its pioneers, Herman Edward Daly (2007), is connected to the sustainability of "throughput." Throughput is the flow of the energy, materials and natural resources that feed the metabolism of the economy, that are used as inputs when creating goods and services (Alternatives Journal, 2017) and that go back to the environment as waste. It could be therefore called the waste stream produced by the economy (Daly, Farley, 2004). In case the steady-state population requires throughput necessary to maintain it at rates beyond the planet's ecosystem regenerative and absorptive possibilities, then the throughput flow becomes ecologically unsustainable, and so does the population (Daly, 2007).

According to sustainability in ecological economics, the future should be at least as well off as the present in term of its access to the natural resources and services supplied by the ecosystem. Bringing this definition into the foundations of economics forces the recognition of the constraints of physical law on economics (Daly, 2007). The ecological economics emphasizes, that the economy is characterized by limits to substitution as well as with important irreversibilities (Stern, 1996). The natural and the manufactured capital are treated rather as complements than substitutes and the natural capital itself is required to be maintained. This approach is called the strong sustainability.

The argument is, that the relation of substitution is reversible – we would not convert so much natural capital into man-made capital if they were substitutes (Daly, 2007). In general, in ecological economics, the economic development is viewed as an evolutionary process that is by its nature irreversible (Perrings, 1987; quoted from Stern, 1996). Also, the economy-environment system is viewed as evolutionary in character (Stern, 1996). Once, the man-made capital was the limiting factor. As an example, the mining of the fuels and metals was once limited by the man-made capital – i.e. the mining capacities, where only little capacities were exploiting large volumes of the fuels and metals. Nowadays, the natural capital is the limit – there is only limited volume of the fuels and mining left. According to this example, the man-made capital cannot substitute for the natural capital (Daly, 2007). Another reason could be that in the ecological economics, the resources are not reduced only to economic assets, but are viewed rather as assets with many different characteristics in the real world, and cannot be consequently easily substituted (Solow, 1993; quoted from Stern, 1996).

We could demonstrate the relationship between the human's behaviour and the planet's ecosystem using the term "ecological footprint," which shows the inequalities between humanity's demands on the planet and the planet's capacity to provide. The term was popularized by a study of Mathis Wackernagel, who estimated the amount of land that would be required to provide the natural resources consumed by the population and to absorb their wastes (Meadows, Randers, Meadows, 2004) – put simply, how much nature we have and how much nature we use.

This approach was later adopted by World Wide Fund for Nature, who reported that since 1970s, the annual demand on the natural resources has been exceeding what could be regenerated on the Earth each year. The world's ecological deficit is referred to as global ecological overshoot (Global Footprint Network, 2017). The ecological footprint patterns are likely to expand along with human population and economic growth (WWF, 2016).

Therefore, the ecological economists claim a limit to growth. Nevertheless, this should not imply the end of the development. Development is seen rather as a qualitative change, evolution towards an improvement. It is solely the increase in the quality of the goods and the services provided by the given throughput (Daly, Farley, 2004). On the other hand, growth should be viewed rather as physical increase in this throughput. There are clearly economic limits to growth, but not to development (Costanza et al., 1997). As Herman Daly and Joshua Farley (2004) put it, only by ending growth it should be possible to continue developing for the indefinite future. The idea of sustainable development is therefore concerning the development without growth – i.e. qualitative improvement in the ability to meet the society's needs and desires without a quantitative increase in throughput and beyond environmental carrying capacity.

1.2.2 Sustainability in the Neoclassical Economics

According to the neoclassical economics, sustainability is defined as a maximalization of welfare over time (in terms of human welfare). The maximalization of welfare is often connected to the maximalization of utility derived from consumption (Harris, 2003). "Utility" refers to the level of "satisfaction of wants," or to the level of the "well-being." Sustainability is then defined as the maintenance or increase of utility – consumption over generations (Daly, 2007). The consumption is a key determinant of the long-run economic growth (Mankiw, 2009).

The neoclassical economics deals mostly with the problems of efficient allocation, secondarily with the distribution and with the scale – the physical volume of the matter and energy in the economy (Constanza et al., 1997).

The market economy best expresses the consumers' preferences and the market system is the institution for allocating resources efficiently (Hussen, 2000). Despite the fact that in standard economic theory, efficient resource allocation should imply maximizing the utility from consumption (Harris, 2003), it does not imply the ecological sustainability (Bishop, 1993, quoted from Costanza et al., 1997),

Although the efficient allocation is the main concern in the neoclassical economics, another dimension should be taken into account: the optimal scale relative to the environment (Hussen, 2000). To neoclassical economists, the scale is determined by prices (Constanza et al., 1997). The optimal point in the production possibility frontier is determined by the preferences of the consumers (Hussen, 2000). In ecological economics, the scale is determined by a social decision reflecting the ecological limits.

As for the distribution, it is determined by prices in the neoclassical economics. In ecological economics, the distribution is determined by a social decision aiming to the just distribution of the assets (Constanza et al., 1997).

The utility derived from consumption is aimed to be maximized and increased over time. In the "Hartwick rule" – a principle derived from work by Hartwick (1977) and Solow (1986), it is stated that the consumption may stay constant or increase with decreasing limited natural resources if the rents from these resources are invested in reproducible capital. According to this rule, the maintenance of the natural capital itself is not required (Harris, 2003).

To neoclassical economists, the man-made capital is a substitute for natural capital, and subsequently they require maintenance of the constant stock of the total capital over time – natural and man-made (Daly, 2007). It is assumed, that substitution between the natural resources and manufactured capital in production is easy and that there is no limit to the extent to which this substitution can be continued (e.g. Dasgupta and Heal, 1974, Solow, 1974, 1986, quoted from Stern, 1996). This approach is called the weak sustainability (Daly, 2007).

The natural resources have no “special” value that would be given by their nature. There is only the economic value, that is determined strictly by consumers’ preferences and the market price. The link between the flow of matter and energy in the economics (called throughput in the ecological economics) and the natural environment is not considered (Hussen, 2000).

Most neoclassical economists believe, that technological advances will eventually outpace the resource scarcity in the long-run and that the ecological services can be easily replaced by new technologies. Therefore, in neoclassical economics, the resource and ecological limits are not the matter of interest (Costanza et al., 1997). The dependence of the economic processes on the natural ecosystem for both the inputs and outputs (waste) is taken for granted (Georgescu-Roegen l993, quoted from Hussen, 2000). There are no biophysical limits in economic growth.

1.3 Aspects of Sustainability and the Sharing Economy

In this chapter, different economic aspects that the sharing economy can potentially affect will be identified and discussed. These aspects will be eventually used in order to interconnect the concept of the sharing economy with the selected models of sustainable growth and development that will be introduced in chapter 1.4 of the thesis, and to demonstrate possible effects of application of the sharing economy on these models.

1.3.1 Consumption and Environment

The current form of consumption in most of the countries is driven by the aspiration to buy and own everything we need (Kassan, Orsi, 2012). Nearly every practice involves the use of material resources. The process of transforming the materials and intermediate products to final products is called production, while the final use and destruction of the products is called consumption (Røpke, 2009). As Alan Durning (1992) put it, high level of production implies huge environmental impact. The processes connected to production can have large volume of harmful externalities such as production of sulfur and oxides that cause acid rain, generation of chemical wastes, radioactive waste, chlorofluorocarbons that cause destruction of the ozone layer and many more.

In the ecological economics, it is argued, that if the life-enabling ecosystem of the planet is to survive for future generations, and in order to increase the environmental space for securing better standards of life to the poor, the wealthy countries have to reduce their own use of natural resources and limit the waste stream. Therefore, the matter of the living standards and consumption arises from this statement (Røpke, 2005). The principle categories are energy, materials and ecosystems – in the lifestyle approach it is the food and beverage, the transportation and the things we buy and use (Durning, 1992). Sharing economy platforms touch on each of these categories.

From the ecological point of view, the individual ownership does not have to be the most efficient way to meet our needs as the goods are typically used only for a fraction of their life-cycle (Kassan, Orsi, 2012). As described in chapter 1.1, sharing economy encourages people to share their excess capacity, whether it is time, space, resources, skills or goods. Previously unused or under-utilized assets are now being put into use (Wosskow, 2016), therefore the need for extra capacities is not created. The sharing economy enables shift from a culture of owning the assets to the culture of shared access to the assets (Bostman, Rogers, 2010, quoted from Martin, 2016).

The sharing economy also encourages reusing and recycling – e.g. through different swapping sites – with books and clothes (Orsi, 2012, quoted from Stemler, 2016), in a tool lending libraries, borrowing and lending, or car-sharing clubs (Kassan, Orsi, 2012) – rather than acquiring new possessions (Orsi, 2012, quoted from Stemler, 2016).

Another feature of the sharing economy is, that it can offer a solution to the peak load time periods (Munger, 2014, quoted from Stemler, 2016). For example, for a city hosting the Olympic games it would be much easier to handle the sudden increase of the number of its visitor if people were allowed to rent out their spare bedrooms. The extra capacities including new hotels would not have to be built just for the special occasion. Sharing economy can therefore limit the potential use of resources and new waste (Stemler, 2016).

Based on Daly and Farley (2004), with lowering the increase of production and consumption, less is added to the structure/system and therefore the throughput can be sustained in the long-run. The sharing economy and connected technological improvements could be viewed as part of the development – qualitative improvement that can enable efficient use of the free capacities without a quantitative increase in throughput.

This efficiency revolution needs to be accompanied by a sufficiency revolution among the wealthiest in the world population (Røpke, 2005). Sustainable world should focus on mindfully increasing the quality of life – trying to find satisfaction in things other than material such as human relationships and leisure, rather than on mindlessly expanding material production, consumption and the physical capital stock (Meadows, Randers, Meadows, 2004). Living the lifestyle of sufficiency rather than excess offers a return to what is, culturally speaking, the human home: family, community, work and life (Durning, 1992). Sharing services' nature clearly goes together with the idea of the ecological economics' sufficiency revolution.

However, there are at least two conditions of decreasing the individual unsustainable consumption with impact of the sharing economy:

1. That the so-called "superusers" are excluded. The definition of the sharing economy includes only people providing and accessing the excess capacity. In case of the superusers, people exploit the sharing economy systems to operate traditional businesses. These users are creating new capacities instead of using their extra ones (Stemler, 2016),
2. That the money saved on the sharing economy services are not later spent on consumption of the goods/activities which in contrary lead to greater unsustainable development. This is called the "rebound effect" (Goudin, 2016).

According to the standard definition of consumption by Gregory Mankiw (2009), consumption can be referred to as the value of goods and services bought by households. It is divided into three categories: nondurable goods (the goods that last only a short time such as clothes or food), durable goods (the goods that last a long time such as car or house) and services.

Based on this division, we could say, that the sharing economy can enable decrease in consumption of the nondurable and durable goods as instead of individually purchasing these goods, the access is shared and therefore the consumption is limited. The users thus pay only the (lower) price of the service of accessing the asset and the overall consumption is decreased.

From the neoclassical point of view, the impact of the sharing economy on the sustainability viewed as maximalization of utility derived from consumption would be thus rather negative. For example, in the "Cost of Non-Europe" study from the European Parliamentary Research Service, the author argues that "*the sharing economy continues to raise doubts among some economists, who emphasise a peculiar paradox: the digital economy, although valued in billions of euros, affords no real solution in terms of stable and sustainable growth. The sharing economy does not properly create assets by itself, and most of its actors do not create added value ... Therefore, economic production is not improved*" (Goudin, 2016, p. 14).

All in all, it could be implied, that provided the two assumptions, the sharing economy can lower the rate of consumption (Martin, 2016), while accessing the equal or similar assets.

1.3.2 Savings

"The saving rate measures how much of its income the present generation is not consuming but instead putting aside for its own future and for future generations" (Mankiw, 2009, p. 495).

Households and firms can save at a higher rate provided two assumptions:

1. That the sharing economy's services and goods can be acquired at a lower price than their analogues in a "traditional" company.
2. That consumers do not spend the money they save on consumption of other assets – level of the savings would therefore stay the same (Nissen, 2016).

The first assumption is rather easy to analyse. More sustainable distribution of resources enables reduction of the costs of accessing the products and services (Botsman, Rogers, 2010, quoted form Martin, 2016).

An analysis from Yochai Benkler has stated, that the “information collection costs” savings on sharing economy platforms appear partly as savings of the buyers in form of lower prices (Benkler, 2002, quoted from Stemler, 2016). As discussed in chapter 1.1.2, because of the application of the scale of the collection and use of the data and personal information, the application of the economies of scale, reduction of the transaction costs, variable costs, distribution costs, manufacturing costs and reduction of the need of capital-intensive infrastructure, the services and products can be acquired at lower price levels than the equal services and products in a non-sharing company (Stemler, 2016).

This can be supported by different researches. For the biggest sharing economy platforms, it is for example research by Busbud (2016), who analysed 220,000 Airbnb listings in 22 cities around the world and compared them to hotel prices in the same areas. According to this research, it is more likely to purchase cheaper accommodation through Airbnb than in a hotel. As for Uber or Lyft, a study by Compare.com (2017) stated, that the sharing economy services are generally cheaper as for the basic fares, however, they can get more expensive when the demand is high.

Moreover, sharing activities supporting peer-to-peer collaboration can bring an extra source of income to the individuals (so-called micro-entrepreneurs or contractors), using the already existing capacities, with the online platform acting as an intermediary (Ranchordás, 2015).

Provided these two assumptions, it can be implied, that the sharing economy can enable increase of the savings rate.

1.4 Economic Growth and Development Models

In this chapter, the models of economic growth and development will be discussed. As for the ecological economics, the Genuine Progress Indicator will be introduced as an alternative metric to GDP to measure the sustainable development of the economy. From the neoclassical school of thought, the Solow growth model will be introduced, based on its precursor, the Harrod-Domar growth model.

1.4.1 Genuine Progress Indicator

In the last decades it was emphasized that the rate of growth of GDP as a standard measure of growth of the economy is what is to be sustained. However, according to this approach, the sustainable economy is equivalent to the growth economy, where the question of whether the sustained growth is biophysically possible arises. GDP does not count with the depreciation of the capital or depletion of natural resources. It is rather a measure of the overall economic activity than a measure of welfare or income. To go to a measure of sustainable well-being, addition of certain adjustments is required (Daly, 2007).

From the 1970s, extensive criticism of GDP growth that was considered a national goal started to emerge. Firstly, the Measured Economic Welfare (MEW) index was introduced as an alternative to GDP. In the period measured, the correlation between the MEF and GDP was positive. About 20 years later, this issue was reconsidered by Daly and Cobb, who developed the Sustainable Economic Welfare Index (ISEW), reviewing the MEW, and discovering, that the positive correlation dramatically changed. The updated version of this index is called the Genuine Progress Indicator – GPI (Daly, Farley, 2004), but the GPI and ISEW are currently considered to differ only by name (Lawn, 2002). This thesis will treat these two as synonyms and will refer to them as to "GPI" only. The GPI is an alternative metric of the economic development, beginning with the part of the GDP, followed by many adjustments to account for the benefits or costs of the economic activities that are being ignored by GDP, thus including the social and environmental benefits and costs that otherwise escape the market valuation. All the items are valued in monetary, real terms.

Below is the table of positive or negative items typically used for the GPI calculation:

- Personal consumption expenditure (+)
- Index of distributional inequality (+/-)
- Weighted personal consumption expenditure
- Cost of consumer durables (-)
- Services yielded by consumer durables (+)
- Services yielded by roads and highways (+)
- Services provided by volunteer work (+)
- Services provided by non-paid household work (+)

- Cost of noise pollution (-)
- Cost of commuting (-)
- Cost of crime (-)
- Cost of underemployment (-)
- Cost of lost of leisure time (-)
- The cost of household pollution abatement (-)
- The cost of vehicle accidents (-)
- The cost of family breakdown (-)
- Net capital investments (+/-)
- Net foreign lending/borrowing (+/-)
- Loss of farmland (-)
- Cost of resource depletion (-)
- Cost of ozone depletion (-)
- Cost of air pollution (-)
- Cost of water pollution (-)
- Cost of long-term environmental damage (-)
- Loss of wetlands (-)
- Loss of old-growth forests (-)

TOTAL = sum of all positive and negative items = GPI (Redefining Progress, 1995; quoted from Lawn, 2002).

1.4.2 Harrod-Domar Model

The same model of economic growth was developed independently by two economists: Roy F. Harrod in 1939 and Evsey Domar in 1946 and is therefore called the Harrod-Domar model. In accordance with the Harrod-Domar growth model, the economy produces a wide spectrum of products. The act of production generates income. This very same income is used to buy these products. The nature of the production depends on the individual preferences and on the distribution of the income in the economy. Generally speaking, the commodity production creates income, which creates the demand for the very same products.

However, all income is not spent on current consumption – households save. By limiting the current consumption, the household funds are made available for the firms to buy the capital goods. This act is called investment. The funds are transferred from the households to the companies by banks, individual loans, governments and stock markets.

By creating or expanding the business, or by replacing worn-out capital, the investments create a market demand for capital goods, which provides the economy with even larger capacity for the production in the future.

This is how the economy grows. However, without the initial savings that translate into investments, it would not be possible to reach such expansion. This is the idea behind the macroeconomic balance – it is achieved when the demand for investments is at the same level as the amount of savings in the economy.

We can express the relationship between the total output, the consumption and the savings by following equation, where *t* = 0,1,2,3 etc.:

$$Y(t) = C(t) + S(t)$$

where Y denotes total output, C denotes total consumption and S denotes total savings (Ray, 1998). Various government policies can potentially influence a nation's savings rate, so one of the goals is to find what savings rate is desirable (Mankiw, 2009).

The value of the output produced must be equal to the consumption goods and the goods needed by investors:

$$Y(t) = C(t) + I\ (t)$$

where *I* denotes investments.

We therefore get the following equation:

$$S(t) = I(t).$$

Thus, the rate of savings is also the fraction of output devoted to investments (Mankiw, 2009).

Investments increase the national capital stock and replace that part of it which is wearing out. Supposed that a fraction of the capital stock depreciates, the following equation must be true:

$$K\ (t+1) = (1-\ \delta)\mathrm{K(t)} + I(t)$$

where K denotes the national capital stock, δ denotes the depreciated fraction of the capital. This equation shows how the capital stock changes over time.

The savings rate could be expressed by the following equation:

$$s = \frac{S(t)}{Y(t)}$$

where s denotes the savings rate, S denotes the total savings and Y denotes the total output (Ray, 1998). For any given capital stock K, the production function determines how much output the economy produces and the savings rate s determines the allocation of this output between consumption and investments (Mankiw, 2009).

The capital-output ratio is the amount of capital required to produce a single unit of output in the economy. It is presented by following equation:

$$\theta\ = \frac{\mathrm{K(t)}}{\mathrm{Y(t)}}$$

where θ denotes the capital-output ratio.

The growth of the economy can be defined by following equation:

$$g = \frac{Y(t+1) - Y(t)}{Y(t)}$$

where g is the overall growth.

If the previous equations are combined, we get the Harrod-Domar equation:

$$\frac{s}{\theta} = g + \ \delta.$$

1.4.3 Solow Model and Steady State

The Keynesian economics and the Harrod-Domar model were eventually rejected by the neoclassical economists. The critique of the model was not due to any significant weakness in the model with its original intent, it was rather a result of being limited to the supply-side growth model only despite its original full theoretical support. The neoclassical growth model was introduced by Robert Solow in 1956.

In contrast to the Harrod-Domar model, the capital-output ratio was permitted to be adjusted, giving the model a stable equilibrium (Van den Berg, 2013). Capital-output ratio is thus endogenous in this model and might depend on the relative endowments of capital and labour. Capital and labour work together to produce output.

The production function is following:

$$Y = F(K, L),$$

expressing that the output depends on the capital stock and the labour force (Mankiw, 2009). If there is more labour than capital, labour-intensive methods are used. Conversely, if there is more capital relative to labour, capital-intensive methods are used and therefore the capital-output ratio rises. (Ray, 1998).

Production function with constant returns to scale enables us to analyse all quantities in the economy relative to the size of the labour force. We can then get the following equation:

$$\frac{Y}{L} = F(\frac{K}{L}, 1).$$

The amount of output per worker Y/L is a function of the amount of capital per worker K/L. Assuming the constant returns to scale, it can be stated, that the size of the economy (the number of workers) does not influence the relationship between the output per worker and the capital per worker. We can then obtain the production function as following:

$$Y = f(K)$$

(Mankiw, 2009).

In the Solow model, the previous equations from the Harrod-Domar model will be kept. We might then combine the equations to get the following:

$$K(t+1) = (1 - \delta)K(t) + sY(t),$$

if we still assume, that total savings $S(t)$ is a constant fraction s of total income $Y(t)$ (Ray, 1998).

We can write out this equation as

$$K(t+1) - K(t) = sY(t) - \delta\mathrm{K}$$

and therefore get

$$\Delta K = I - \delta K,$$

because $sY(t) = S$ and $S = I$. ΔK is the change in the capital stock from one year to the next.

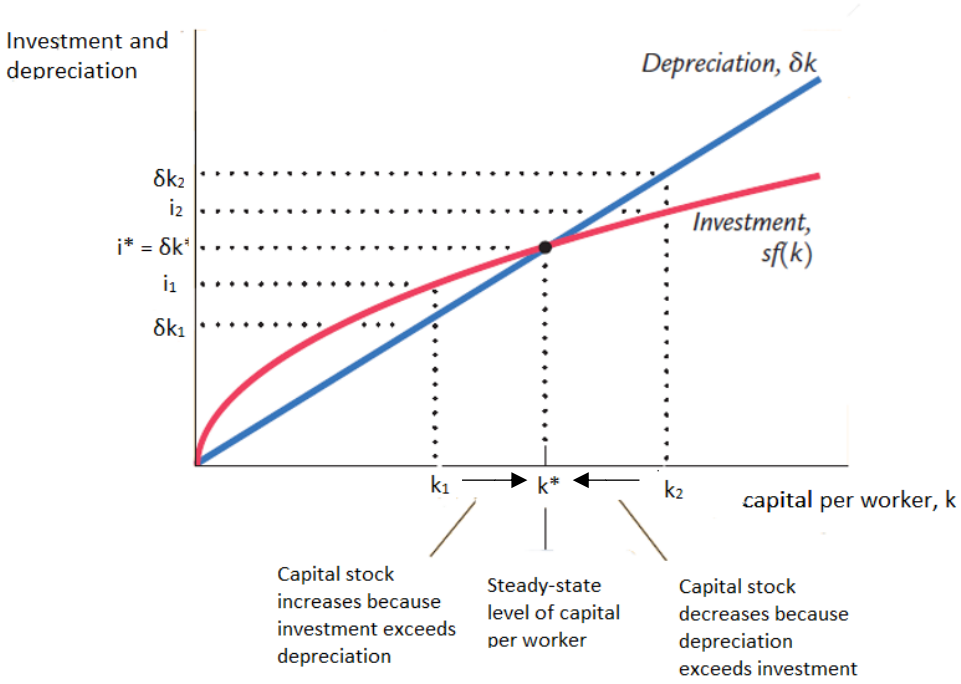
As previously mentioned, we can express investments as $I = sY$ and if we substitute the production function, we can write the equation as

$$\Delta K = sf(K) - \delta K.$$

The higher the capital stock, the greater the amount of output, investments, and also the amount of depreciation.

There is a single capital stock K^* level at which the amount of investments equals the amount of depreciation. At this level of capital stock, the investments and depreciation balance and therefore the capital stock will not change. At $\Delta K = 0$, the capital stock K and output $f(K)$ are steady over time. We call K^* the steady-state level of capital. This state is very significant for two reasons: first, the economy that finds itself at this level will stay there. Second, the economy that is not at this level will go there.

Graph 1: Investments, Depreciation and the Steady State



Source: Mankiw (2009, p. 197).

As we can see on the Graph 1, it does not matter on the initial level of the capital, because the economy will end with the steady-state level of the capital (Mankiw, 2009). "*In this sense, the steady state represents the long run equilibrium of the economy*" (Mankiw, 2009, p.197).

The optimal amount of capital accumulation and the optimal steady state according to Solow model is the one with the highest level of consumption. The steady-state value of capital that maximizes the consumption is called the Golden Rule level of capital K^*_{gold}. The steady-state consumption per worker could be written as

$$c^* = f(k^*) - \delta k^*,$$

because consumption is output minus investments. Output per worker is $f(k^*)$, where k^* is the steady-state capital per worker and because the capital stock is not changing in the steady state, the investments equal depreciation δk^*.

This equation shows, that the capital affects both the output and depreciation. Therefore, it is important whether the capital stock in the economy is below or above the Golden rule level. If it is below, increase in the capital stock raises output more than depreciation, so the consumption rises, and vice versa.

Because the slope of the production function is the marginal product of capital MPK and the slope of the δk^* is δ, the Golden rule equation is as follows:

$$MPK = \delta.$$

(Mankiw, 2009). "*At the Golden Rule level of capital, the marginal product of capital equals the depreciation rate*" (Mankiw, 2009, p. 205). The economy does not automatically gravitate toward the Golden rule level of the capital. To reach any specific capital stock, we need a specific savings rate, that can be determined by the nation's policy.

In the Solow model described so far, the economy stops growing after reaching the steady state. The technological progress needs to be introduced to describe the persistent economic growth.

The technological progress expands the production capabilities in the economy. The production function with the technological progress could be written as

$$Y = F(K, LxE)$$

where E denotes the efficiency of labour. The efficiency of labour reflects the knowledge about the production and rises also with improvements in health, education and skills. The LxE denotes the effective number of workers. The technological progress causes the efficiency of labour E to grow at a constant rate g – the labour-augmenting technological progress. Because the labour force L is growing at rate n, the effective number of workers is growing at rate $n + g$. Although the actual number of workers does not increase, as each worker comes with more units of labour over time, the technological progress causes the effective number of workers to increase. The quantities will be now analysed as quantities per effective worker. Because $k = \frac{K}{L} * E$ and $y = \frac{Y}{L} * E$, we can write that $y = f(k)$.

The evolution of k over time could be expressed as following:

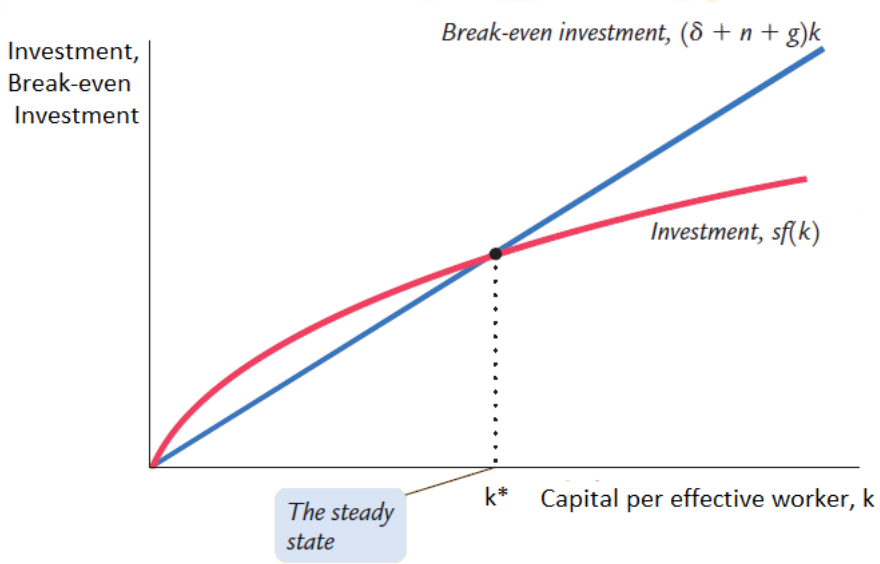
$$\Delta k = sf(k) - (\delta + \mathrm{n} + \mathrm{g}) * k,$$

as to keep k constant, δk is needed to replace depreciating capital, nk is needed to provide capital for new workers and gk is needed to provide capital for the new "effective workers" from the technological progress.

The capital per effective worker k is constant in the steady state, and so is the output per effective worker as $y = f(k)$. Output per actual worker $\frac{Y}{L}$ equals $y * E$. As y is constant in the steady state and E is growing at rate g, output per actual worker is also growing at rate g in the steady state. The economy's total output Y equals $y * (E * L)$. Similarly, as L is growing at rate n, the total output of the economy is growing at rate $n + g$ in the steady state.

Therefore, it can be implied that the technological progress can lead to sustainable growth in output per worker. Once the economy is in the steady state, its growth depends only on the rate of technological progress.

Graph 2: Technological Progress and the Solow Growth Model



Source: Mankiw (2009, p. 224).

We can view on Graph 2, that in the steady state, investments $sf(k)$ exactly offset the reductions in k (depreciation, population growth and technological progress).

The Golden Rule is then defined as the steady-state maximizing of the consumption per effective worker. The steady-state consumption per worker is

$$c^* = f(k^*) - (\delta + \mathrm{n} + \mathrm{g})k^*$$

and the steady-state consumption is maximized if

$$MPK = \delta + n + g.$$

At the Golden Rule level of capital, the net marginal product of capital equals the rate of growth of total output $n + g$.

The Solow Model simply assumes, that there is only one kind of capital, however, in fact there are many types. The knowledge and skill of the workers acquired through education is called the human capital. As the physical capital, it also increases the ability to produce goods and services. Raising the level of human capital requires investments to education – teachers, libraries and student time. Skills of the workers are then improved, increasing the human capital and thus the ability to produce goods and services.

When pursuing the sustainable economic growth, it must be considered which form of capital provides the highest marginal product. Policymakers can rely on the marketplace to allocate the savings to alternative types of investment. The technological progress is taken as exogenous in the Solow model, however, modern theories try to explain the creation of the knowledge through research and development (Mankiw, 2009). The social return to research is large – Mankiw (2009) states, that it is often about 40 % a year, compared to the return to physical capital, which is about 8 % per year.

To sum up, once the economy is in the steady-state, its growth in the long run is determined only by the rate of the technological progress.

2 Application of Sharing Economy to the Economic Growth and Development Models

In this chapter, sustainability of the current state of economic growth will be approached from both standard and ecological point of view. Consequently, the previously mentioned sharing economy aspects (impact on consumption, environment and savings) will be interconnected with the GPI, Solow and Harrod-Domar models to identify the potential effect the sharing economy can have on sustainability from both ecological and neoclassical schools of thought.

2.1 Sustainability of the Current Economic Growth

As discussed in chapter 1.2.2, in standard (neoclassical) economics, the sustainability is defined as maximalization of welfare over time, that is often connected to the utility derived from increase in consumption (Harris, 2003). The GDP growth is an estimate growth of the value of production of goods and services in the economy (World Economic Forum, 2016c). It has been often used as a standard measure of the economic growth and progress (World Economic Forum, 2016a), related to the welfare and economic health (World Economic Forum, 2016c). It has been serving as a barometer of the nation's policies' success for decades, aimed to be sustained in the long-run (World Economic Forum, 2016a). The growth of the GDP remains a fixation and a target for governments around the world and is also a regular topic on the agenda of global and regional groupings such as the G20 and the European Union (World Economic Forum, 2016c).

From this point of view, we could assess the world's wealthiest countries according to their real GDP in 2016: United States (GDP ca. 18.6 mil. USD), China (ca. 11.2 mil. USD), Japan (ca. 5 mil. USD), Germany (ca. 3.5 mil. USD) and United Kingdom (ca. 2.6 mil. USD) (World Bank, 2017a).

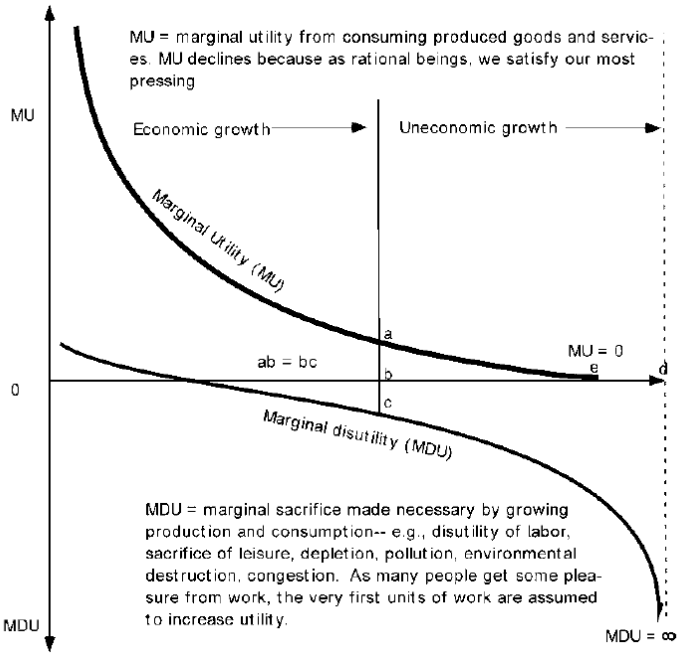
As for the real GDP growth, measured annually in 2016, the biggest relative growth was measured in countries such as Iraq (10.2 %), Ethiopia (8.4 %, measured in fiscal year), Côte d'Ivoire (7.8 %), Bhutan (7.4 %), Uzbekistan (7.4 %), India (7 %), Cambodia (7.0 %), Philippines (6.8 %) or China (6.7 %) (World Bank, 2017b).

In absence of a measure of economic welfare, most policymakers view the GDP as an index of the change of welfare, based on the following:

Total welfare = economic welfare + noneconomic welfare

It is assumed that the economic welfare and total welfare move in the same direction (Daly, Farley, 2004). However, it is quite possible for the GDP to go in the opposite direction of welfare (World Economic Forum, 2016c). Based on the theory of ecological economics, it is important to think in terms of the optimum scale of the economic subsystem relative to the total ecosystem. Beyond the optimal point, further economic growth becomes uneconomic. This term is used mostly in ecological economics and does not compute in neoclassical economics – where all growth is considered economic. Yet the concept of optimum is vital to economics and to some economists it is clear that the growth beyond the optimum level is uneconomic – in the sense that it increases costs more than benefits, therefore making us poorer, not richer (Daly, 2007).

Graph 3: Limits to growth of the macroeconomy



Point b = economic limit or optimal scale, where MU = MDU; e = futility limit, where MU = 0; d = catastrophe limit, where MDU = infinity. Source: Daly, Farley (2004, p. 269).

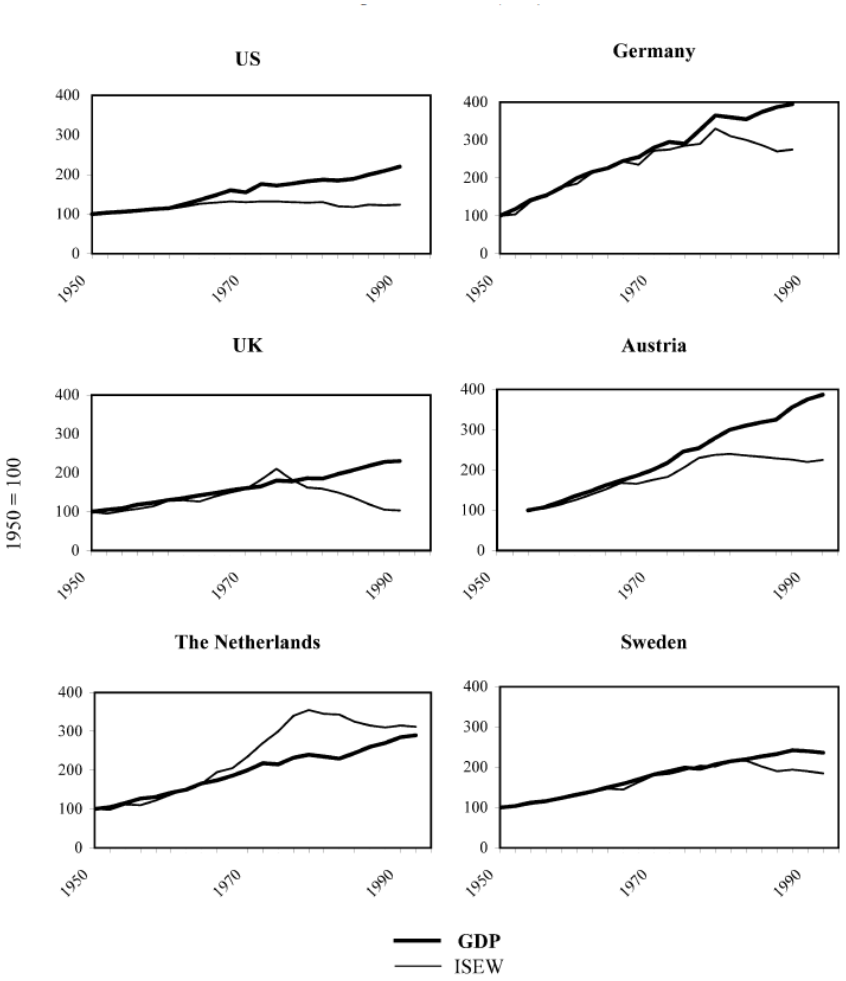
The optimal scale of consumption is demonstrated on Graph 3. It is the point where marginal utility equals the marginal disutility, therefore the society has the maximal net utility. Beyond this point, further growth becomes uneconomic as with increased consumption, the disutility is higher than the utility. Eventually, the population reaches the futility, where no more utility is being added with increased consumption (Daly, 2007).

Measured in constant dollars, since 1950, the whole population in the world has consumed as many goods and services as all previous populations put together. The average citizen of an industrial country consumes many times more than a citizen of a developing country. The ecological impacts of the consumption even reach into the local environments of the developing countries (Durning, 1992).

The wealthy countries have probably already reached the futility limit; the point, where further growth becomes unsustainable. Increasing consumption beyond this level of sufficiency does not increase happiness. While growth in wealthy countries is probably uneconomic, it can still be economic in the developing countries as they most probably have not reached this point (Daly, 2007).

We can illustrate this assumption on the examples of the graphs of different economies comparing the evolution of the GDP and the ISEW (GPI), that was introduced in the chapter 1.4.1. GPI was designed to more closely approximate the sustainable economic welfare or progress (Lawn, 2002).

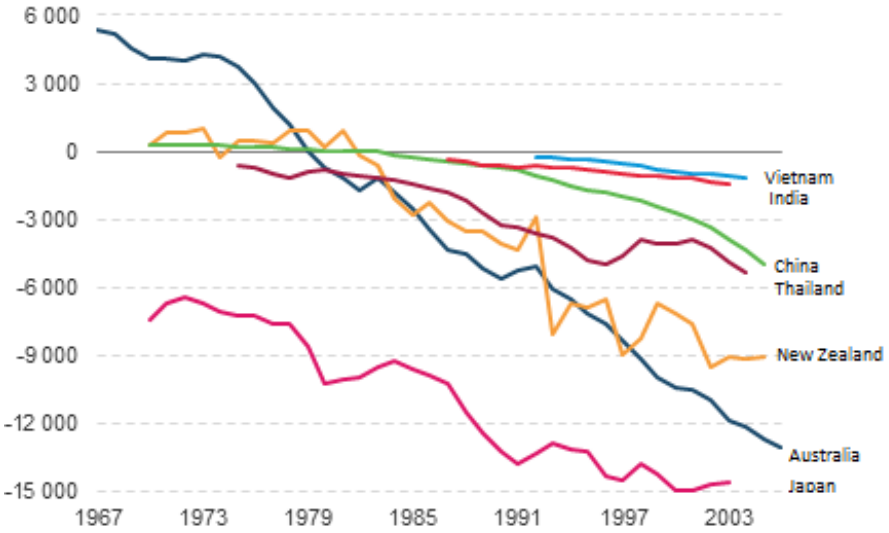
Graph 4: Comparison of GDP and ISEW for the US, Germany, UK, Austria, The Netherlands and Sweden; 1950 = 100



Source: Jackson and Stymne (1996, quoted from Lawn, 2002, p. 104).

It can be observed on Graph 4, that up to a certain point, the GPI correlates positively with the GDP. Beyond this point, further growth becomes uneconomic, measured by decrease in the GPI.

Graph 5: GPI - GDP gap for selected Asia-Pacific countries, 1967–2006, USD per capita, 2004 prices



Source: UNCTAD (2016).

On Graph 4 and Graph 5, it can be observed, that although the world's GDP leading countries – United States, China, Japan, Germany and United Kingdom – have the highest absolute value of GDP, the gap between GDP and GPI is extending. The same applies for the countries with the highest relative growth of GDP such as India and China.

The GPI is positively correlated with the GDP up to a certain point, where the correlation becomes negative. Despite of the use of alternative measures of a nation's welfare being difficult and rather controversial, it can be observed that there is no evidence that the GDP growth equals increased welfare – in certain periods, this evidence is weak, in certain it is even non-existent. However, if the GDP is to be the main goal of a country, it is expected, that it measures the general welfare more accurately (Daly, Farley, 2004).

Another measure of the sustainability of the current economic growth could be the ecological footprint. Today's humanity needs the equivalent of 1.6 Earths to provide the resources we use and to absorb our waste – we use more ecological resources and services than the nature can regenerate (Global Footprint Network, 2017). If current trends continue, unsustainable consumption and production patterns will likely expand along with human population and economic growth (WWF, 2016).

Limits to growth refer to both population and economic growth – that is to growth in population and to growth in per capita resource use (Daly, 2007). Over the last 50 years, humans have multiplied their own population, their physical possessions and the material and energy flows – following a pattern that is called exponential growth (Meadows, Randers, Meadows, 2004). This growth of total resource use could be expressed by the increase in the economic throughput (Daly, 2007).

Some ecological economists argue, that the throughput flows currently generated by the human economy cannot be maintained at their present rates for very much longer. Blind pursuit of physical growth in a finite world ultimately makes most problems worse. On the other hand, the current high rates of throughput are not necessary to support a decent standard of living for all the people in the world. In theory, there are many possible ways to bring the throughput and the ecological footprint back to its limits. It could be reduced for example by lowering the population, by implementing new resource-efficient technologies, by raising costs or by increasing pollution burdens. Moreover, the consumption norms need to be adjusted (Meadows, Randers, Meadows, 2004).

As Herman Daly (2007) put it, it needs to be learnt and accepted that growth can be uneconomic. It is important to emphasize that the macroeconomy too is a part of a larger finite whole, that is the ecosystem.

The optimal scale of the macroeconomy relative to its containing ecosystem is the critical issue which the standard economics has overlooked, which could have led to the problem of unsustainability.

2.2 Sharing Economy and Economic Growth and Development Models

In this chapter, the use of the key sustainable aspects of the sharing economy from chapter 1.3 will be expanded. Firstly, the aspects of consumption, environment and savings described in detail in chapter 1.3 will be interconnected with the Genuine Progress Indicator to evaluate the effects of the sharing economy on measure of the ecological sustainability of economic development. Secondly, the aspect of savings will be interconnected with both Harrod-Domar model and the Solow model. The effects of the sharing economy on the neoclassical sustainability of the growth of the economy in the long-run will be deduced.

The possible effects of these aspects in the models will be discussed and the final implications of the application of the sharing economy on the sustainability from both ecological and neoclassical point of view will be evaluated.

2.2.1 Sharing Economy and Genuine Progress Indicator

According to sustainability in the ecological economics, the future should be as well off as the present in term of its access to the natural resources and services supplied by the ecosystem and the natural resources should be treated and measured accordingly (Daly, 2007).

The GPI is an alternative to the standard measure of the economic growth – GDP, used as a measure of sustainability of the economic development in the ecological economics. It adjusts the GDP by including social and environmental costs and benefits that are otherwise not measured (Lawn, 2002).

The items used for calculation of the GPI can be seen below, with items that would be affected with application of the sharing economy marked bold. The potential effect of the sharing economy on selected items is specified by the arrow. The final sign (positive/negative) of the item specified in the brackets is constant, e.g. for a cost of natural depletion, the final value of the item would be less negative with application of the sharing economy.

- **↓Personal consumption expenditure (+)**
- **↑↓Index of distributional inequality (+/-)**
- **Weighted personal consumption expenditure**
- Cost of consumer durables
- Services yielded by consumer durables
- Services yielded by roads and highways
- Services provided by volunteer work
- Services provided by non-paid household work
- **↓Cost of noise pollution (-)**
- **↓Cost of commuting (-)**
- Cost of crime
- **↓Cost of underemployment (-)**
- Cost of lost of leisure time
- The cost of household pollution abatement
- The cost of vehicle accidents
- The cost of family breakdown
- Net capital investments
- Net foreign lending/borrowing
- **↓ Loss of farmland (-)**
- **↓ Cost of resource depletion (-)**
- **↓ Cost of ozone depletion (-)**
- **↓ Cost of air pollution (-)**
- **↓ Cost of water pollution (-)**
- **↓ Cost of long-term environmental damage (-)**
- **↓ Loss of wetlands (-)**
- **↓ Loss of old-growth forests (-)**

TOTAL = sum of all positive and negative items = GPI (Redefining Progress, 1995; quoted from Lawn, 2002).

How could the application of the sharing economy concept affect the GPI?

Firstly, the aspect of consumption and environment from chapter 1.3.1 will be examined and will be extended by the distributional inequality index, followed by the aspect of savings from chapter 1.3.2

1. ↓ Personal consumption expenditure (+)

   The starting point for measuring the GPI is the personal consumption, because we are interested in the welfare connected to this consumption (Kainuu, 2011). As discussed in chapter 1.3.1, based on authors such as Martin (2016), Stemler (2016) or Goudin (2016), the sharing economy can enable the shift from the culture of owning the assets to the culture of shared access to the assets. The sharing economy encourages reusing and recycling and offers a solution to the peak-load problems. If we assume that the "superusers" are excluded from the system and the money saved are not spent on another consumption, it could be implied, that with application of the sharing economy, the consumption is lowered, all other things being equal. The sharing economy can also be a support for the so-called sufficiency revolution and could be viewed as a contrast to the materialism and overconsumption (The Economist, 2013).

2. ↑↓Index of distributional inequality (+/-)

   In neoclassical economics, the relationship between the distribution of the rights to resources and allocation of these resources is being ignored. Therefore, the equity in the distribution of rights to resources is not important. However, sustainability is also a matter of intragenerational and international equity. In the world with big differences between the poor and rich, the intragenerational transfer of the access to the assets is likely to be unsustainable. The very rich do not have to worry about the next generations having enough. The very poor generations can, however, exploit resources and the ecosystem in general in order to survive (Costanza et al., 1997). People in the world are distributed unequally, some of them consuming too little and some of them consuming too much for the earth's good. The goal should be not to raise the income of the poor and middle income into consumer class, but to converge these three groups (Durning, 1992).

The marginal benefits of increased income are lower for the rich people as the poor enjoy the increase in their income more. Therefore, the distribution of income can have important effect on the nation's economic welfare – measured for example by Gini coefficient (Lawn, 2005).

As examined in chapter 1.1, with application of the sharing economy, people can make money from the assets and skills they already own. Sharing economy services can offer a form of part-time or even full-time work to people otherwise unemployed. As the barriers to entry are very low, it is easy to start a small business and the opportunities to participate in the concept are wide (Stemler, 2016).

Also, the sharing economy services are quickly growing as for the market share and value, thus potentially lowering that of the "traditional big companies" (PWC, 2016), as discussed in chapter 1.1.2. Sharing economy promotes sharing and collaboration between people, empower them and decentralise the power structures in the economy and society (Martin, 2016).

Therefore, it could be implied that with application of the sharing economy, the distributional inequality index could be increased, other things held constant.

3. Weighted Personal Consumption

Weighted personal consumption is personal consumption divided by income distribution index multiplied by 100. If the previous items are affected, this item is affected as well. The weighted personal consumption becomes the base number for further adjustments (Kainuu, 2011).

4. ↓Costs of Environmental Degradation and the Depletion of Natural Resources (-)

We could group the following items into one group: cost of long-term environmental damage, cost of air pollution, cost of water pollution, loss of farmland, cost of resource depletion, cost of noise pollution, loss of wetlands, loss of old-growth forests and cost of ozone depletion. These items compose the damages to the environment caused by human activity.

While GDP counts these as part of the income, GPI treats them as costs (Kainuu, 2011). As discussed in chapter 1.2.1, based on authors such as Daly (2007) or Stern (1996) in the ecological economics, the economy is viewed as a subsystem of the biosphere. The natural resources are not treated as economic assets only, but they have a special value as the access to the natural resources is required to be maintained for the future generations and the natural resources cannot be substituted by the human capital. The depletion of natural resources should be therefore appropriately measured.

As discussed in chapter 1.3.1, the sharing economy can lower the consumer demand of resources and the production. Based on the ecological view of Daly (2007) or Durning (1992), we could see the sharing economy as part of the development, qualitative progress with efficient use of the free capacities without quantitative increase in the throughput that can be therefore sustained, affecting all of the basic areas in ecological sustainability.

The costs of environmental degradation and the depletion of natural resources could be potentially decreased, all other things unchanged.

5. ↓Cost of Commuting (-)

There are two kinds of costs that are being reflected in the GPI: first is the money spent to commute and the second is the cost of the time spent commuting, that could be used for other activities (Kainuu, 2011).

When using the carpooling or short-term car rentals, the transportation costs are divided into more people. When using sharing rides, the costs of transportation are usually lower than for taxi services (Compare.com). With application of the sharing economy services, the money spent to commute potentially decrease, as discussed in detail in chapter 1.3.2. The amount of money spent to commute decreases and the time spent commuting stays the same if we consider the substitution of the taxi with sharing economy services, individual rides with carpooling and individual ownership of a car with a car rental and we do not consider the public transport as a substitute for the sharing economy services.

If we considered the sharing economy services as an alternative to the public transport, with increase in use of the car-sharing services, the government could be encouraged to decrease the investment in public transport, thus increasing its price (Goudin, 2016). On the other hand, this kind of transportation could possibly lower the time spent commuting by ensuring better transport possibilities in underserved areas. It could also complement public transportation by providing solution to the "first-mile/last mile" problem – helping riders get to and from existing routes (Davidson, Infranca, 2016).

Secondly, the aspect of underemployment briefly mentioned in chapter 1.1.2. will be applied:

6. ↓Cost of underemployment (-)

   The cost of underemployment falls on the workers and their families as well as on the society as whole, who may be affected by potential increase in frustration, crime, violence or alcoholism connected to underemployment. Every hour of underemployment is treated as a cost in the GPI (Kainuu, 2011). As discussed in chapter 1.1.2, one of the driving forces behind the sharing economy was the increasing unemployment after the outbreak of the financial crisis in 2008. The sharing economy platforms provided the "gig" or part-time jobs there (Stemler, 2016). Therefore, it could be implied that with application of the sharing economy, the cost of underemployment decreases, all other things being equal.

With concept of the sharing economy analysed in detail in the previous chapters, it could be implied that the following items are affected:

- ↓ Personal consumption expenditure (+)
- ↑↓ Index of distributional inequality (+/-)
- Weighted personal consumption expenditure
- ↓ Cost of commuting (-)
- ↓ Cost of underemployment (-)
- ↓ Costs of environmental degradation and the depletion of natural resources (-).

To conclude, the personal consumption expenditure could be potentially decreased with application of the sharing economy, however, the index of distributional inequality would be decreased as well. Therefore, the final impact on the base number (the weighted personal expenditure) would depend on which effect dominates. The negative values of the above items that are subtracted from the weighted personal consumption expenditure could be potentially lowered with application of the sharing economy model and the whole GPI could be thus increased as for adjustments of these items, all other things being equal.

2.2.2 Sharing Economy and Harrod-Domar Model

In chapter 1.4.3, the logic behind the Harrod-Domar growth model was explained and eventually we got the final equation:

$$\frac{s}{\theta} = g + \delta.$$

The Harrod-Domar equation links the overall growth to the two fundamental variables: the ability of the economy to save and the capital-output ratio. Therefore, the growth rate could be enhanced by increasing the savings rate, or by decreasing the capital-output rate (Ray, 1998). Based on assumptions from chapter 1.3.2 with conclusion, that sharing economy can potentially increase the savings rate, it could be implied, that in the Harrod-Domar model, application of the sharing economy can lead to sustainability in growth of the economy.

2.2.3 Sharing Economy and Solow Model

The Harrod-Domar model was followed by the Solow model. As described in chapter 1.4.3, in the Solow Model, the long-run equilibrium of the economy is called the steady state.

With adjustments of the Harrod-Domar Model, we can get the following equation:

$$K(t+1) = (1 - \delta)K(t) + sY(t),$$

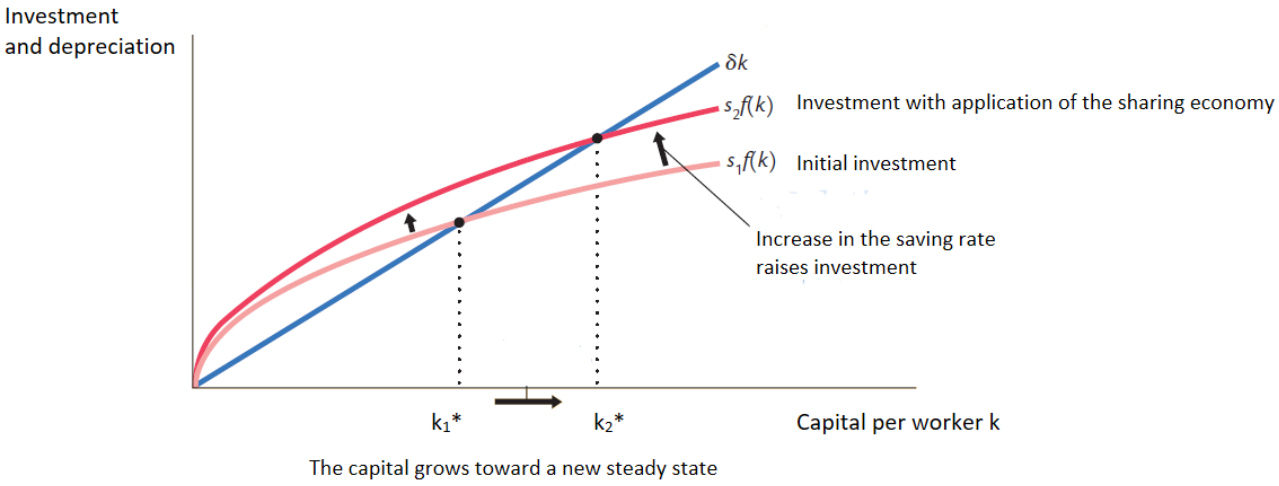
with further adjustments, we can get the following:

$$\Delta K = I - \delta \mathrm{K}.$$

In the steady state economy, $\Delta K = 0$ at a specific level of capital stock K^*. $I = S$ and $S = s * Y$ (Mankiw, 2009).

As discussed in chapter 1.3.2, provided that the sharing economy services and goods can be acquired at lower prices and that people do not spend money they save on another consumption, it could be implied that the savings rate is increased with application of the sharing economy. What happens to the economy when the savings rate increases?

Graph 6.: Sharing Economy's Effect on the Savings and Investments



Source: Own compilation based on Mankiw (2009, p. 201).

Based on explanation of the Solow model from Gregory Mankiw (2009), with application of the sharing economy and increase of the savings rate s, the investments increase and the savings function is shifted upward.

In the Solow steady-state, the economy begins in a steady state with savings rate s_1 and capital stock k_1^*, where the amount of investments equals the amount of depreciation. Right after increasing the savings rate s_1 to s_2, the investments are higher, with the capital stock and depreciation unchanged. Investments thus exceed the depreciation. The capital stock will consequently gradually rise until the economy reaches the new steady state k_2^*. This process is demonstrated on Graph 6.

If the savings rate is higher, the economy will have a larger capital stock and a higher level of output. The increase of the savings has a so-called "level effect," increasing the level of income per person. How much of the output is devoted to the savings and investments determines, whether the country is rich or poor.

As discussed in chapter 1.4.3, the optimal steady state according to the Solow model is the one with the highest level of consumption. The steady-state value of capital that maximizes the consumption is called the Golden Rule level of capital k^*_{gold}. The golden rule equation is as follows:

$$MPK = \delta.$$

As the economy does not automatically gravitate toward the Golden rule level, a specific savings rate is needed to support it. To find the Golden rule steady state, the marginal product of capital needs to be assessed.

If we assume, that most of the developed economies have more capital than in the Golden rule steady state, the savings rate needs to be decreased by the policymakers, which leads to immediate higher level of consumption and decrease in investments in the model. Investments are thus lower than depreciation, the capital stock falls, leading to reduction of the output, consumption and investments. These continue to fall until the economy reaches the Golden rule steady state, where the consumption is higher than it was before the change in savings rate (Mankiw, 2009).

Based on this consideration, application of the concept of the sharing economy with increase in savings rate thus cannot help achieving the Golden rule steady state where the consumption is maximized in most of the countries.

Increase of the savings in the Solow growth model implies the increase in the income per person and higher level of output. However, savings cannot generate persistent economic growth.

"The Solow model shows that the savings rate is a key determinant of the steady-state capital stock. … What does the Solow model say about the relationship between savings and economic growth? Higher savings leads to faster growth in the Solow model, but only temporarily" (Mankiw, 2009, p. 201).

As opposed to the Harrod-Domar model, the savings rate affected by the sharing economy does not imply the sustainable long-term growth of the economy.

As described in chapter 1.4.3, the steady-state growth rate of the economy is determined solely by the technological progress in the long run, where the efficiency of the labour and the effective number of workers are introduced to the Solow model. The technological progress can lead to sustainable growth in output per worker. The Golden Rule is then defined as maximalization of the consumption per effective worker. The consumption is maximized, if the net marginal product equals the rate of growth of total output $n + g$. Although being exogenous in the Solow Model, the technological progress is explained through research and development in modern theories (Mankiw, 2009).

Maintaining the Solow model's theory and the findings from chapter 1.3.2 with conclusion, that the sharing economy concept may imply higher savings rate, the importance of allocation of the savings to alternative types of investment has to be recognized.

Based on the Solow model theory by Mankiw (2009), if we assume that part of the savings from the sharing economy is invested into research and development, the technological progress can be increased, resulting in higher efficiency of the labour, expansion of the production capabilities and causing the effective number of workers to increase.

Application of the concept of the sharing economy can thus potentially enhance the technological progress in the Solow model, which can lead to sustainable long-run growth of the economy in the neoclassical point of view.

2.3 Question of Regulation of the Sharing Economy

To protect the public from the market failures in the sharing economy, the question of the efficient regulation arises. There is a vital need to find a balance between imposing the existing ill-fitted regulation from the non-sharing sector on the sharing economy and between no regulations at all. Why should the sharing economy have different rules than the non-sharing sector (Stemler, 2016)? As described in the previous chapters, the sharing economy can under certain conditions potentially lead to sustainability of the economy. The sharing economy should be thus regulated in an "innovation-friendly" way – transparent, consistent and flexible (Ranchordás, 2015, quoted from Stemler, 2016). In this chapter, the most important areas of regulation are to be discussed as they are connected to the assumptions used in the models in the thesis and to the use of the sharing economy in the real world. It is the regulation of the tax policy and the regulation of the fair competition.

As described in the neoclassical Solow model, the way the sharing economy affects the savings, an important factor of the economy, is determining its level of the capital stock. Policymakers in many countries argue, that the nation should devote a higher fraction of the output to savings and investments. In the Solow model, we described the change of the capital accumulation through the increase in private savings encouraged by the sharing economy. Moreover, the capital accumulation can be encouraged by the policymakers through the public savings (the difference between the tax revenue of the government and the government spending) and tax incentives for private savings, although many disagreements about the effects of the policies emerge (Mankiw, 2009). Therefore, the first regulation should apply to the tax policy. It is argued, that the traditional legal boundaries are easily blurred in the sharing economy, which can result in legal grey areas and regulatory uncertainty. The lack of the specific rules can lead to multiple legal problems.

The sharing economy platforms often act only as intermediaries between the users and therefore make the users responsible for complying with local regulations, which applies for the taxes as well (Ranchordás, 2015). It is therefore important to ensure, that the taxes are not being avoided by the users. The solution could be for example to automatically monitor the compliance with the local regulations, requiring licensing of the providers or requiring the platforms to collect the taxes on behalf of the users for the government. The regulatory response continues to evolve (Davidson, Infranca, 2016). For example, Airbnb has started collecting local taxes (such as occupancy taxes or tourist taxes) for their hosts in certain areas (Airbnb, 2017a). As for the VAT (a tax assessed on the supply of goods or services), the users (hosts) need to assess the VAT on the services provided and are encouraged to consult a tax advisors if needed. Airbnb itself collects the VAT on its own service fees (Airbnb, 2017b). As for the income tax, the hosts are encouraged to consult a tax advisor as well (Airbnb, 2017c). Another example could be Uber, where the drivers are treated as independent contractors, which means, that they are again responsible to file the tax return each year (Uber, 2017).

The question of choice between the interest to stimulate innovations and the need to protect the public from the potential harm arises (Ranchordás, 2015). From the ecological point of view, the right tax system for the sustainable economy would alter what it taxes. *"Instead of taxing the income earned by workers and businesses (the value added), it would tax the throughput flow (that to which value is added) … Such a tax induces more efficient resource use in both production and consumption and is relatively easy to monitor and collect. Taxing what we want less of (resource depletion and pollution) and ceasing to tax what we want more of (income) would seem reasonable"* (Daly, 2007, p. 22).

Based on this opinion, it could be argued that the sharing economy services could benefit from lower taxes as they can potentially lead to sustainable development of the economy with lower quantitative increase in the throughput and use of natural resources, as discussed in chapters 1.2.1 and 1.3.1.

From the neoclassical point of view, the sustainable growth depends on the technological progress (Mankiw, 2009). *"Policymakers can promote economic growth by setting up the right legal and financial institutions so that resources are allocated efficiently and by ensuring proper incentives to encourage research and technological progress"* (Mankiw, 2009, p. 244). Based on this proposition, we could also refer to the tax policy as an incentive in the sharing economy that could potentially lead to sustainable growth of the economy, as described in chapter 1.4.3.

Second regulation should apply to the exploitation of the system by so-called "superusers," as one of the assumption for limiting the consumption in the chapter 1.3.1. It is often argued that the sharing economy can create an unfair playing field (Marshall, 2015, quoted form Stemler, 2016). Some users are using the platforms on such a large scale that they look like the counterpart traditional businesses. These "superusers" are therefore developing new capacities instead of using the excess capacities, and they are thus exploiting the system (Stemler, 2016). Surprisingly enough, the platforms themselves can support the superusers. For example, Airbnb on its website offers a guideline on how to earn easy money by employing a co-host – that can be operating on an investments property or on extra space (Airbnb, 2017d). The so-called "superusers" need to be excluded from the system to ensure the fair competition by efficient regulation – for example by limiting the scale of use of the platforms (Stemler, 2016). *"If it were able to provide decent earnings and reasonably low prices, the sharing economy could be an important component of that new model of the sustainable economy. Today, however, with the corporatization of a number of the leading players, the role of the sharing economy in a just and sustainable transition is an open question"* (Schor, 2014).

The role of the public sector in the sustainability in general is crucial and is highlighted for example in the United Nations' Sustainable Development Goals from The World Investments report (2014), which represents effort to shift the global economy – both developed and developing – onto a more sustainable trajectory of long-term growth and development.

As for the relationship between public and private sector, it requires mutual partnership between the private sector and the government. From the financial point of view, it describes the requirement of the major change in the aspects of both public and private investment. The public finances are not sufficient anymore as the investment requirements are large and the public budgets are limited. However, the public sector is needed to push the investment in the sustainable development goals in the right direction.

Except the tax regulation and the regulation of the fair competition that are closely connected to the models used in the thesis, there are many other areas of regulation of the platforms that are important and interesting topics for further discussion and research, including areas of insurance to allocate risk, background checks and the system of the ratings and reviews to prevent fraud and ensure safety, and the regulation of employment (e.g. Lobel, 2016, Stemler, 2016).

2.4 Assumptions and Discussion

Both ecological and neoclassical school of thought has certain limits of the extent of use of its theories of growth and development that are important to be understood.

In the ecological economics, the economy is a subsystem of a finite larger ecosystem, which is non-growing and materially limited. One of the issues is, that these limits are not strictly defined (Daly, 2007). Physical growth on a finite planet must eventually end. But when will it end and what forces will cause it to decline (Meadows, Randers, Meadows, 2004)? The challenge is to express these rather subjective limits in economic terms, and to integrate them into our long-term decision-making. We not only need to know what scale of economy and throughput will eventually disrupt the ecosystem. We need to know when the extra ecosystem disruptions begin to cost us more in terms of sacrificed ecosystem services than they benefit us in term of extra production and therefore where the optimum scale ends (Daly, 2007).

Ecological economists assume, that the economic well-being of a nation can be measured by the GPI, but the indicator is only approximate and rather subjective as the value of the benefits and costs is assessed subjectively – not based on the market value, and the benefits and costs spread over time (Daly, Farley, 2004). The list of the items accounted varies as well as some of the valuation methods, or methods used for different countries due to availability of certain data and the different preferences of the researchers (Lawn, 2002).

Despite the alerts of the ecological economists, that humanity is immersed in problems beyond its control, the changes are not currently being made fast enough. The reason is that there is no prompt pressure to make them and because they take a long time to implement. However, the speed at which the people and institutions respond is vital (Meadows, Randers, Meadows, 2004).

In the neoclassical – standard point of view, the issue is, that it is often believed that growth will provide the nation with welfare and therefore the growth-oriented policies are supported. Governments view the growth of the economy as a solution for almost every problem and they seek to produce more and more growth. Growth is treated as a key for fighting unemployment, and in the poor world, the growth is believed to be the only way out of poverty. It is perceived that growth is demanded to provide the resources for protecting the environment. For these reasons, the growth, measured mostly by the GDP growth, is perceived as a source of success. However, from the ecological point of view, such growth cannot be sustained in the long term (Meadows, Randers, Meadows, 2004).

Currently, we are witnessing the conflict between a physical impossibility (limitless growth) and a political impossibility (decreasing growth). But in the long run the physically impossible is more impossible than the solely politically impossible (Daly, 2007). However, many governments have started to think beyond GDP as a measure of economic development and growth (World Economic Forum, 2016a). The leading economists and academics agree, that the GDP is a poor way of assessing the health of the economies and the new measure needs to be found (World Economic Forum, 2016c).

What matters in the society should be decided and measured to evaluate the progress. As Michael Spence put it, the governance and smart policy-making play a critical role, being the biggest factors that distinguish the countries in terms of the overall well-being (World Economic Forum, 2016a).

This is connected to criticism of the neoclassical Solow growth model. Authors such as Robert Lucas pointed out the problem of application of the Solow model to cross-country differences. The technological progress as a source of growth is viewed to be determined by non-economic reasons and does not work between countries. The most important evidence against the Solow model was the failure of growth in many poor countries. With high returns to scarce capital, they should have demonstrated the fastest growth. However, in the last half century, they have done much worse on average than the developed countries. An additional aspect of criticism is, that the Solow growth model theory was applied to the United States only and was never applied to any other country by the author, although becoming the basic theory of economic growth, explaining the growth in the developed as well as in the poor countries (Easterly, 2001).

Another issue is, that in the neoclassical economics, the highest level of consumption is aimed to be reached, which was also demonstrated in the Solow model's Golden rule steady-state as the optimal state of the economy. Based on authors such as Daly (2007) or Kassan and Orsi (2012), increasing the consumption is often a primary goal of the government and the national economic policy and the forces that stimulate the consumption such as advertising and social pressure are often being overlooked. However, as discussed in chapter 1.3.1, high level of consumption does not have to be the most efficient from the ecological point of view as it can have large impact on the environment. Still, the transformation of the consumer society into sustainable society is rather difficult. However, the sharing economy might serve as a way for solving this.

Conclusion

Sharing economy is a form of economic behaviour that allows people to use their extra capacities – time, space, skills or resources. The sharing economy platforms are highly dependent on the technology, which enables them to operate on a large scale, dealing also with the role of trust in sharing and resulting in an economic as well as cultural breakthrough. Although the participation and market share of the sharing economy platforms is rather small, it is growing quickly with high expectations for the future. The market share of the sharing economy platforms is estimated to be equal to the non-sharing sector by 2025.

The sharing economy can have various effects on sustainability of the development and growth. Different schools of thought need to be distinguished when analysing the sustainability. The ecological economics views the economy as a subsystem of the ecosystem, and therefore the sustainability of the economy depends on the environmental sustainability – maintenance of the access to the natural resources and services supplied by the ecosystem, whose value should be measured accordingly. Today's humanity needs equivalent of 1.6 planets to provide the resources and absorb our waste. Sharing economy can lower the consumer demand of resources by enabling decrease in the level of production and consumption provided by the efficient use of the excess or under-utilized capacities. Sharing economy can also support the so-called sufficiency revolution that is an important complement for lowering the unsustainable consumption.

The production and consumption has been driving the GDP as a measure of the economic growth for many decades, assuming that the economic and total welfare move in the same direction. However, GDP does not necessarily positively correlate with the society's well-being. The alternative is the GPI that measures the economic development while including the environmental and social costs and benefits that are otherwise not valuated. When comparing the GDP and GPI, it can be observed, that they correlate positively up to a certain point, which is called the optimal point in the ecological economics. Beyond this point, the well-being is not being increased with further growth.

Therefore, the ecological economists argue that there are limits to growth and that the developed countries have probably reached these limits. It is important to adjust the consumption norms especially in these countries.

When measuring the GPI, the sharing economy affects the weighted personal consumption (the base number). It also affects some of the items that are subtracted: the costs of environmental degradation and depletion of the natural resources, the costs of commuting and the costs of underemployment. The whole GPI could be thus increased as for adjustments of these negative values, all other things unchanged.

In the neoclassical school of thought, the sustainability is viewed as maximalization of welfare over time, given by increase in utility derived from consumption. There are no ecological limits to economic growth. This theory can be supported by the Solow model, where the optimum long-run equilibrium of the economy – the Golden rule steady state – is the one with the highest level of consumption. It could be implied, that the sharing economy affects the savings rate, that is increased because of the reduction of the costs caused by factors such as efficient distribution, application of the economies of scale and reduction of transaction and variable costs. Instead of individually purchasing the asset, the service of access to the asset is shared. With application of the sharing economy, most of the economies do not reach the Golden rule steady state, where the consumption is maximized. Increase in savings implies increase in the income per person and higher level of output. However, savings cannot generate persistent economic growth. The long-run growth in the Solow model is provided only by the technological progress, where the importance of allocation of the savings to alternative types of investment needs to be recognized. If we assume, that part of the savings is invested into research and development, it could be implied, that with application of the sharing economy, the technological progress is increased, thus leading to the sustainable economic growth. Compared to the Solow model, in Harrod-Domar model, application of the sharing economy with the increase of the savings rate can directly lead to the sustainability in growth of the economy.

To conclude, the sharing economy can have positive effect on the sustainable development of the economy from the ecological point of view. From the neoclassical point of view, the sharing economy does not lead towards maximalization of the consumption, however, it could potentially reinforce the technological progress, thus leading to the long-run growth of the economy.

To protect the public from market failures, the efficient regulation is needed to complement the application of the sharing economy. The areas of regulation include the tax policy, exclusion of the superusers, regulation of risks, promotion of safety and employment.

Although the sharing economy is a relatively new phenomenon and we cannot exactly forecast its progress, we can definitively observe its potential. Its impact on the sustainability especially in developed societies could be significant. It would be valuable to have more exact statistical data as this phenomenon evolves in time to see if it can really have an impact on the sustainable development from both ecological and economic perspective.

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