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1 Introduction

Ever since the financial crisis erupted in 2008, public discussions about the importance of fostering growth have accelerated. Even before popular opinion seemed to be that growth was the ultimate goal of economic policy. With the beginning of the financial crisis in 2008 growth was everything politicians all around the world were worrying about. So not only popular gut feeling said that growth was everything we needed for everyone to be rich and happy. Even now six years later the question of how to make our economies grow is one of the most important topics for politicians and media.

In April 2014 Matteo Renzi, prime minister of Italy, declared in an interview, that one of his primary goals for the upcoming Italian Presidency of the European Council would be to make European policy more growth enhancing. (*cf. Thomson Reuters*) At the end of the same month British politician Boris Johnson accused the European Union to hinder growth. (*cf. London Evening Standard*) Whatever they think of European growth policy, it seems that politicians agree, that fostering economic growth is one of their primary tasks to accomplish.

Also the European Union commits itself to enhancing growth. In 2010 the EU introduced the new strategy for growth, the 2020 Strategy. On the EU website the statement of José Manuel Barroso, President of the European Commission reads:

“Europe 2020 is the EU's growth strategy for the coming decade. In a changing world, we want the EU to become a smart, sustainable and inclusive economy. [...]“

(European Commission (a)).

And even in its relations to the other side of the Atlantic, growth policy ranges high on the priority list. Concluding the EU-US Summit in March 2014 the two partners released a joint statement consisting of 33 points. The statement starts off with point one being the expected reaffirmation of their “strong partnership” and while “non-proliferation, disarmament and arms control” is considered in the last point of the statement in point three it says:

*"Reinforcing **economic growth** and **job creation** remains central. The EU and the United States have taken important steps to stabilize financial conditions and overcome the crisis."*

(The White House, original emphasis)

It all sounds a bit like a fairy tale, we only have to find the right agent to stimulate growth and we all will live happily ever after. But while it is all not that simple and it is highly debatable whether growth will make all of us better off, growth – if we think about growth in productivity – surely has a positive effect, as there is a bigger pie to be divided between the people. Therefore fostering growth also seems to be theoretically reasonable, even though it is not on us economists to determine the primary goals of a government. But obviously policies with the aim of fostering growth are very important to the leaders of the European Union as well as to the politicians of its member states. With the Stability and Growth Pact, the Lisbon Strategy and the Europe 2020 Strategy, the European Union has more than once introduced projects designed to enhance growth in the region.

This raises plenty of questions at the intersection of politics and economics that need to be addressed from a scientific perspective. Given my interest in politics and also in economics, I wonder whether the growth policy conducted by the European Union is theoretically reasonable and appropriate for reaching its goals of enhancing economic growth.

In this thesis I attempt to address the question if the policy outlined in the Lisbon Strategy is suitable for enhancing growth within the European Union. Attempting to answer this question, two other questions arise: (i) Which are the driving forces of economic growth? and (ii) is it possible at all to effectively stimulate economic growth through policy?

In order to answer these questions I will first give a short overview of the history of economic growth policy in the European Union. Thereby I attempt to show the development the policy instruments used today have undergone. As my focus in this thesis lies on the Lisbon Strategy, I will then describe this particular strategy in more detail. In this chapter I will assess the goals of the Lisbon Strategy as well as the principle measures

lined out. At the end of this first chapter I will also give some empirical findings in connection with the Lisbon Strategy, regarding the reaching of the goals as well as general growth trends within the European Union.

In a next step I will turn to economic theory in order to tackle the question what fosters economic growth. In principle I will assess the contributions of the two main driving forces of economic growth suggested by theory, namely human capital and technological progress. As I will use this in order to assess growth policy in reality I will also think about questions like “Is there a substantial difference between progress due to research and development on one side and innovation as described by Schumpeter on the other side?” and “What types of human capital are growth enhancing, if any?”.

I will then confront the European growth policy with the key implications from economic theory. In this chapter I will answer my research question about the expediency of the means of the Lisbon Strategy. At the same time I will assess whether the assumption that growth can in principle be created is theoretically justified and whether a unitary growth policy for the whole European Union like the Lisbon Strategy makes sense at all. Based on these findings I will describe the policy implications to be drawn from my theoretical evaluation of the Lisbon Strategy, reflecting on what an effective growth policy on the European level could look like. In line with these implications I will make some short comments on future developments, namely what is new about the current growth strategy Europe 2020 in comparison to the Lisbon Strategy and whether this new project is likely to effectively enhance growth.

2 A short History of European Union Growth Policy

With the entry into force of the Treaty on European Union, commonly known as the Maastricht Treaty, the EU early on committed itself to economic growth as a major goal. In Article B the Union sets itself five objectives, of which the first one is

“to promote economic and social progress which is balanced and sustainable, [...]

(European Communities (a), p. 4).

Within Article G the Treaty establishing the European Economic Community was amended and thereby Article 2 replaced, such that it would from then on state:

*“The Community shall have at its task [...] to promote throughout the Community a harmonious and balanced development of economic activities, **sustainable and non-inflationary growth** respecting the environment, a high degree of convergence of economic performance, a high level of employment and social protection, the **raising of the standard of living** and quality of life, and economic and social cohesion and solidarity among Member States.”*

(European Union (a), p. 5, emphasis added)

Although growth was already a goal and in principle the framework for cooperation in the area of economic policy was set, no explicit European growth policy was conducted. *(cf. Collignon, p. 223)*

In 1997 the Member States of the European Union agreed upon the Stability and Growth Pact. In this pact fiscal rules were outlined, which prohibit excessive deficits. Specifically deficits of more than 60 % of GDP and a growth of deficits by more than 3 % of GDP, already outlined in the Maastricht Treaty were ruled out and even a sanctions mechanism was intended. So although it was labelled Stability and Growth Pact, it was much more of a stability than a growth pact. *(cf. Beirat für Wirtschafts- und Sozialfragen 2005, p. 39; and European Communities (b))*

In a Presidency Conclusion of March 2000 in Lisbon the European Council set the goal for the EU

“to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion“

(European Parliament).

outlining an overall strategy consisting of three points, of which the last is *“sustaining the healthy economic outlook and favourable growth prospects by applying an appropriate macro-economic policy mix”* (European Parliament), as well as more detailed goals. It is this strategy that is known as the Lisbon Strategy.

In the course of the midterm-review of the Lisbon Strategy the so-called Kok-Report was issued in 2004. This report can be read as an urgent call for action in order to reach the targets set out in the Lisbon strategy. Also it is stated in the report that the European Union has to focus merely on two primary goals, namely economic growth and employment. In part as a reaction to that the Commission in a Communication from the President called for a new start for the Lisbon Strategy. This new start was then agreed upon in the Presidency Conclusion of March 2005 and included the focus on growth and employment suggested within the Kok-Report. *(cf. High Level Group chaired by Wim Kok, especially p. 14; as well as Council of the European Union)*

As a follow up strategy after the termination of the Lisbon Strategy in 2010 the Europe 2020 Strategy was adopted. This strategy again focuses on growth and jobs, only the implementation of the policy is slightly different to the Lisbon Strategy. Within the Europe 2020 strategy unambiguous targets in five areas are set: 75 % employment rate of people between 20 and 64 years of age, investment in R&D of 3 % of GDP, some targets on renewable energy, rates of early school leaving below 10 %, at least 40 % of 30 to 34-year-olds completing third level education and a goal on fighting poverty and social exclusion. *(cf. European Council, p. 2-6; as well as European Commission (b))*

In 2011 a reform on the Stability and Growth Pact commonly referred to as the six-pack was issued. This reform especially strengthens sanction mechanisms regarding excessive deficits, no further emphasis was put on the topic of growth. (cf. *European Commission (c)*)

2.1 The Lisbon Strategy

Starting point for the so-called Lisbon Strategy was the European Council meeting in March 2000, where the European Council set the strategic target for the European Union

“to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion“

(European Parliament),

within the following ten years. Even though the European Council only sets the overall strategy for the policy of the EU, this strategic goal was followed by another ten sub-goals, each of which itself consisted of further points to be treated. What I subsequently labelled sub-goals gives us a basic idea of which policies were to be conducted by the European Union and its Member States in order to reach the overall goal. (cf. *European Parliament*)

The first goal is “[a]n information society for all” and focusses mainly on easy access to information technology for all people (cf. *European Parliament*). For the purpose of my analysis this is to be seen in connection to education, as well as information. Concerning education, providing all people with the access to information technology simply equips them with the ability to use the technology, also in a working environment. In connection to information the access to information technology is crucial in order to find job opportunities and therefore for the allocation of human resources.

“Establishing a European Area of Research and Innovation” is the second goal. Here mainly three mechanisms of improving research and development are deployed, ensuring the collaboration between research institutions within the Union, encouraging private investment in R&D and improving patent protection. (cf. *European Parliament*)

The third goal is a call for “[c]reating a friendly environment for starting up and developing innovative businesses, especially SMEs”, which mainly aims at making the environment favorable for start-ups, e.g. via financing possibilities (cf. *European Parliament*). Therefore it focusses on innovation in the sense of Schumpeter. Later on I will talk more in detail about the difference between R&D and Innovation in the Schumpetarian sense.

The next point about “[e]conomic reforms for a complete and fully operational internal market” (*European Parliament*) is not so much of interest for my research, although it may have some consequences through the effects of increased competition between firms within the European Union.

Point five targets “[e]fficient and integrated financial markets” (*European Parliament*) and is as well only of minor interest in connection with my research question. The financial market itself is not an important component of growth, although these institutions have an impact on the incentives structure regarding investment in physical as well as in human capital. The sixth goal is to “[c]oordinate macro-economic policies” in order to stimulate capital accumulation (also in human capital). This point is of importance for economic growth, as it shows some of the instruments the European Union is using in order to set incentives, but it gives no further insight about the exact macro-economic policy measures intended. (cf. *European Parliament*)

Seventh on the list is a point about “[e]ducation and training”. The European Union commits itself to “a substantial annual increase in per capita investment in human resources”, whereby they are in principle focusing on primary and secondary education. (cf. *European Parliament*) The effects of education on growth and the differences between types of education will be discussed at length in the following chapter.

The eighth task is on employment, where the major goal is to reduce unemployment, by filling in skills gaps by enhancing mobility and by training opportunities. Therefore this is to be seen in close connection to the previous point. The ninth and tenth point are on social protection and therefore not of interest for this analysis. (cf. *European Parliament*)

In the course of the midterm review of the Lisbon Strategy, the high level group carrying out the evaluation called for immediate action and a refocussing concerning the targets. (*cf. High Level Group chaired by Wim Kok, p. 16*) In connection with that the Lisbon Strategy was re-launched in 2005 through a “partnership for growth and jobs”, also foreseeing the missing of the targets. In the course of the re-launch more emphasis was given to immediate action, instead of long-term goals.

It was also in the fields of growth and jobs where exact numbers were given as targets in the Presidency Conclusion being the starting point for the Lisbon Strategy. Namely an average annual GDP growth rate of 3 % and an overall employment rate of 70 % with an employment rate for women of 60 %. Another goal of investing at least 3 % of GDP in R&D that was set in the course of the implementation of the Lisbon Strategy has to be seen in the same light. (*cf. European Parliament; and Commission of the European Communities, p. 20*)

The implementation of the Lisbon Strategy relies on many actors. Before the re-launch in 2005 reaching 3 % GDP growth was merely a strategic goal to be reached in combination with a call to all Member States and EU institutions to contribute. Key was, that national governments set the reaching of the Lisbon targets as a top priority in their own agenda. Within the framework of the Lisbon Strategy no clear country specific goals were set, therefore making it hard to assess whether individual countries have contributed to the strategy. It was only in 2005 when all Member States were invited to present national reform programs for reaching the Lisbon targets, and in 2007 for the first time country specific recommendations were issued by the council. Moreover before the re-launch no actions on the EU-level were intended, it was only in 2005 when a community layer was added to the Lisbon strategy. In the same year integrated guidelines on growth and jobs were issued that also set strategic goals, but do not really explain the course of action intended. (*cf. European Parliament; and European Commission (d), p. 18-21*)

Summing it up the Lisbon Strategy focusses on five main areas to achieve the overall targets of 3 % GDP growth and 70 % employment. One means to stimulate growth is to attract more investment in physical capital. Another area focusses on skill gaps in the

labour market and tries to raise employment by creating training possibilities as well as enhancing mobility within the Union. In close connection with the former is an intended increase in human capital formation focussing merely on primary and secondary education. Apart from that investment in R&D is another area of action identified in the Lisbon Strategy. Another priority is creating an innovation friendly environment. While one can assess whether action in these fields can enhance growth it is hard to tell whether the means are theoretically reasonable, as they are different in every country.

2.2 Empirical Evaluation

Even though the European Commission still claims the Lisbon Strategy had a positive impact on the European Union it has clearly failed to reach its target. (*cf. European Commission (d), p. 3*)

Labour productivity in the European Union (measured in Euros per hour worked) is growing approximately 50 cents per year, this growth rate has been prevalent since 1995 and does not seem to have changed after the implementation of the Lisbon Strategy. In the United States, although labour productivity has already been higher the growth rate is higher than in the European Union – somewhere near one Euro per year – and is also persistent. Therefore the labour productivity in the European Union has not increased due to Lisbon and the aspired catch-up to the United States was not achieved. *

Concerning investment in R&D little has been achieved as well. There was a slight increase in investment in R&D from 2000 to 2005, but this seems to be mirroring the past path of development of R&D investment. Also the target of 3 % of GDP invested in R&D was clearly missed with investment in R&D amounting to about 2 % of GDP in 2010. *

For education the evidence is somewhat mixed. While spending on education does not seem to have accelerated, the rate of early leavers from education and training has diminished substantially from above 17 % in 2000 to about 14 % in 2010. *

* For detailed statistics see Appendix A

Therefore it is not surprising, that also the targeted growth rate in GDP has not been attained. This sheds a particularly bad light on the Lisbon Strategy, as GDP growth was nearly 3% already in 1998 and 1999 and above this value in 2000. Therefore the GDP growth rate has even diminished. The target on employment has been clearly missed as well, with about 64 % in 2010. Only the employment of women was near the target. *

So why is it that the Lisbon Strategy has worked so poorly? Does it only lack the right implementation? Is the agenda wrong? Or is it impossible to generate growth at all?

* *For detailed statistics see Appendix A*

3 Driving Forces of Economic Growth

In order to assess these questions, I will now turn to growth theory in order to extract the factors that have an impact on growth for the examination of the reasonability of the Lisbon Strategy in the following chapter. In my analysis I will focus on growth of per capita GDP in the form of labour productivity growth rather than on GDP growth for the obvious reason that only productivity growth leads to a growth in wealth to be divided between the populace as it is effectively influencing the GDP per capita.

I will start with some short remarks on the assumed relationship between employment and economic growth that is included in the Lisbon Strategy. Traditionally economic growth theory does not explicitly model labour with respect to growth, as economic growth in the long-run is not linked to employment ratios. Traditionally growth theory works with per capita variables with the (unrealistic) assumption of full employment. However, as long as employment rates are approximately constant over time this assumption leads to reliable results. A higher rate of employment will *ceteris paribus* lead to GDP growth – especially when demand in labour is filled through skill adaption, however this is naturally only a short-run effect. Let us assume it would be possible to achieve full employment. If the technology does not change an increase in employment will lead to a higher GDP per capita, but as soon as we reach full employment it cannot grow anymore and GDP growth is again depending on increasing productivity. So, although it is a good idea to fill skill gaps in order to achieve a higher GDP, higher employment rates will not foster long-run growth rates.

But how about the reverse effect? Does economic growth lead to higher employment rates? Economic theory suggests, that there are positive as well as negative effects of growth to employment. On the one hand an overall increase in productivity should lead to higher demand and thereby also create jobs, which would lead to higher employment rates. However, there are several counter-effects.

In economics there is the notion of a “natural rate of unemployment” arising as it always takes some time for a worker to find a new job fitting his skills, respectively for an employer

to find an unemployed with the skills for a vacant job. This natural rate of unemployment depends on the frequency of job destruction, as well as on the job-finding rate. Therefore trivially economic growth that leads to a faster obsolescence of technology and thereby to a higher rate of job-destruction, which will raise the natural rate of unemployment. Also faster obsolescence of technology leads to a decrease in expected profits by creating a new firm and thereby jobs, which will again raise the natural rate of unemployment. There is also a positive effect of productivity growth on employment, if firms can upgrade their technology their expected profits will rise again, which counteracts the before mentioned effect. (*cf. Aghion, Howitt 1998 (b); ch. 4*)

The question which of these two effects is stronger is an empirical one. A look at the data shows, that in the long-run the negative effects of productivity growth on employment dominates and there is a negative relationship between economic growth and employment for industrialised countries. (*cf. Saint-Paul 1991*) Therefore we have a first finding:

In advanced countries a negative relation between employment and growth is to be expected. Therefore pursuing employment goals through growth policy does not seem to be useful.

For a growth policy within the European Union this leads us to the conclusion, that pursuing growth policy in order to create jobs is not supported by economic theory. If anything, there is the need to counteract the negative effect, that growth enhancing policies will most likely have on employment, for example by supporting employers and employees in their job-finding and worker-finding activity, respectively.

Traditionally it has been argued that long-run growth depends solely on labour augmenting technological progress, however Aghion and Howitt argue that capital and technological progress are to be seen as complements. (*cf. Aghion, Howitt 1998 (a)*) Following this argument incentives for both physical and human capital accumulation are also crucial for long run growth. However, technological progress remains a key factor for long-run growth, without technological progress no long-run growth in per capita output can be achieved. Therefore I will turn to growth models that explicitly model technological progress.

The most intuitive ways to stimulate technological progress are research and development and innovation. The difference is only a minor one, while we typically connect R&D with research labs and big amounts of money spent on technological development, innovation may also occur as a simple idea, produced by human capital without large amounts of physical capital being used. In addition innovation in the Schumpeterian sense implies that a finding is implemented in the market. It is exactly these factors human capital, R&D and innovation, on which endogenous growth theory focusses.

The model developed by Romer assumes a technology that uses knowledge as an input factor that has increasing returns to scale, thereby rendering growth rates that are increasing over time possible. The main finding of the Romer-model is, that investment into R&D and the development of human capital increase the productivity and thereby household utility. Due to the positive spill-over effects generally there is an underinvestment in R&D so that a government intervention increasing the spending in R&D would lead to a productivity improvement, however overinvestment could at some point also occur and the correct level of government spending on R&D is not easily determined in reality. Again it is helpful to turn to empirical testing to get more evidence. Jones & Williams empirically tested for under- and overinvestment in the R&D sector and find that typically there is the expected underinvestment in the R&D sector.

A drawback of Romer's model is that the innovation process at the firm level is not modelled. (*cf. Romer 1986; as well as Jones, Williams 2000*) But it delivers another finding:

Typically there is underinvestment in R&D due to externalities, therefore a government intervention shifting resources to R&D should be growth enhancing in the long-run

This points to the need to set incentives for private actors to invest in R&D, as well as to the importance of governmental spending in R&D, as most likely private spending on R&D will never reach an optimal level due to externalities. However as I will discuss in more detail later, it is important to figure out which kind of R&D activities will most likely lead to an economically deplorable innovation.

In their paper Aghion and Howitt present a Schumpeterian model, thereby explaining the differences in growth rates between the EU and the US that is a very useful framework in order to assess growth policy. In their model they explicitly take into account the distance of economies to the world technology frontier and the importance of entrance into the market. They also model the benefits from innovation to firms, making it possible to think about ways of influencing innovation efforts and thereby economic growth. (cf. Aghion, Howitt 2006)

The technology is modelled through a simple Cobb-Douglas production function*

$$Y_t = A_t^{1-\alpha} K_t^\alpha \quad (1)$$

Innovation always takes place at the industry level shifting up the productivity. In this framework the evolution of a whole new industry, as often happens in reality, especially in the IT sector, is not considered. However the technology of the economy is not dependent upon the number of industries. A new sector would necessarily have a better technology, since otherwise no resources would be allocated to the industry, thereby shifting up overall productivity in the same way as imitation or innovation within the industries would do. Therefore the model provides a framework that can capture a variety of mechanisms of technological progress.

Technology grows due to two different kinds of technological progress, imitation and innovation. Imitation is the implementation of technology already available in the world, therefore getting the economy closer to the technology frontier $\bar{A}_t$; while innovation is improving the technology therefore the economy is afterwards producing at the technology frontier. Imitation and innovation take place at the frequency μ_m respectively μ_n . In the case of innovation the new technology is some multiple γ of the technology previously used.

Therefore the change in productivity will be*

$$A_{t+1} - A_t = \mu_n(\gamma - 1)A_t + \mu_m(\bar{A}_t - A_t) \quad (2)$$

* For detailed derivation of the model see Appendix B

The growth rate of technology is amongst other things dependent upon the distance to the technology frontier:

$$g_t(A_t) = \mu_n(\gamma - 1) + \mu_m(a_t^{-1} - 1) \quad (3)$$

where a_t is an inverse measure of distance to the frontier.

This dependence upon the distance to the technology frontier captures some kind of catching-up effect. As long as the country is far from the technology frontier imitation of existing technology means a big improvement of technology used, the nearer the economy to the technology frontier, the closer the effect of imitation to zero, therefore innovation gets more and more important when moving closer to the technology frontier. Therefore we get another central insight for growth-enhancing policy:

We expect, that the closer an economy to the technology frontier, the more effective are policies aiming at leading edge innovation in comparison to imitation of existing technology.

This finding has the implication, that it is of high importance for developed countries to identify those R&D institutions most likely to deliver leading-edge innovation when pursuing to enhance growth. Higher spending in R&D is not enough to increase economic growth. Governments have to identify where there is potential for innovation in order to invest and in the case of state-owned research institutions one has to find ways to encourage research aiming at leading-edge innovations.

Which aspect can possibly be influenced by a government? It is the frequency of imitation and innovation μ_m and μ_n . How does this work? Aghion and Howitt suggest two further enhancements of the model, one considering the firms' decision of conducting R&D when facing competition and the second incorporating the effects of education on the rents of imitation and innovation.

* For detailed derivation of the model see Appendix B

One commonly known prerequisite for innovation – when assuming knowledge to be non-rival and non-excludable – is the possibility to effectively exclude others from using it via enforceable patents.

Therefore another policy implication is, that

Effective patent law must be in place in order to promote innovation

However it cannot be inferred from theory which level of protection is the best. Overprotection has to be avoided as much as underprotection.

Competition is also important in order to make it necessary for firms to be innovative. Typically in the Schumpeterian framework one assumes that with a certain possibility a new firm enters the market with better technology and takes it over, thereby replacing the older firm as monopolist. In connection with this Aghion and Howitt propose a model that also takes into account the possibility of firms that use the best technology to escape replacement by innovating themselves before other firms and thereby blocking off entrants.

In this model profits are a certain share of the technology used, technology grows by γ in each period and with probability p there is an entrant. Therefore the marginal benefits of innovation are*

$$v_{it} = [\gamma - (1 - p)]\delta\bar{A}_{t-1} \quad (4)$$

if the firm was at the technology frontier and*

$$v_{it} = (1 - p)(\gamma - 1)\delta A_{i,t-1} \quad (5)$$

if the firm was below the technology frontier.

This means that for an industry below the technology frontier the threat of entrance has a discouraging effect regarding innovation, while for industries at the technology frontier entry threat is even innovation enhancing.

* For detailed derivation of the model see Appendix B

There are also many empirical studies that find evidence for a positive relationship between competition and innovation, especially when looking on OECD countries, therefore supporting this theoretical insight. (*cf. Ahn 2002*)

Inferring from this we can conclude that

For a country close to the technology frontier over-protection would be problematic, as in this position competition is expected to be central in promoting innovation

This leaves us with a rather delicate mandate for the state actors. There has to be a balance between protection of patents that is strong enough to maintain gains from innovation for producers, but not so strong as to reduce competition in a way that leads to a slowdown in technological progress. Also this finding points to the need of an effective competition law preventing for monopolies to appear.

How do R&D activities conducted by state actors fit into this framework of innovation modelled by Aghion and Howitt? There are two possible channels. First when we think of inventions made by state-owned institutions, we can argue that they will not be protected by patents or used for establishing a monopoly as governmental activity is designated to benefit all and can therefore be used by all actors in the market. Therefore the invention made will be applied by the current monopolist or the entering incumbent and will therefore lead to a faster growth in productivity. In this framework, another channel through which governmental research activity can influence innovation and imitation is the by-product of skills, as for example in universities.

The linkage between education and the two innovation processes is also modelled within the framework of Aghion and Howitt. They extend their framework by adding Cobb-Douglas production functions that use unskilled and skilled labour as inputs when modelling the frequency of imitation and innovation.

Augmenting the law of motion of technology one obtains*

$$A_t - A_{t-1} = u_{mt}^\sigma s_{mt}^{1-\sigma} \bar{A}_{t-1} + \gamma u_{nt}^\phi s_{nt}^{1-\phi} A_{t-1} \quad (6)$$

Some transformations yield the producer's maximisation problem*

$$\max_{u_m, u_n, s_m, s_n} \{ \delta [u_m^\sigma s_m^{1-\sigma} + \gamma u_n^\phi s_n^{1-\phi} a] - \omega_u (u_m + u_n) - \omega_s (s_m + s_n) \} \quad (7)$$

where a_t measures proximity to the frontier. We assume that skilled labour is used more heavily in innovation, while unskilled labour is used more heavily in imitation ($\sigma > \phi$). As parameters δ, γ and a are given, as well as the number of skilled ($s = s_m + s_n$) and unskilled ($u = u_m + u_n$) workers, there is a unique equilibrium.*

The closer a country is to the technological frontier, the more growth enhancing is any increase in the share of skilled labour in the labour force. Empirical testing of historical data conducted by Becker, Hornung and Woessmann supports this view. They find strong evidence, that in the industrial revolution primary and secondary education was one of the main determinants for the speed of catching-up, while it was not important for the technological leader Great Britain. (*cf. Becker, Hornung, Woessmann 2011*)

Therefore we get another insight,

For countries close to the technology frontier investment in higher education is expected to be more beneficial than investment in primary and secondary education

The link between economic growth and human capital has regularly been contradicted by empirical studies, however more recent studies find, that these earlier findings were made due to measurement errors or misspecification of the models. These recent studies find a strong link between education and economic growth. (*cf. Krueger, Lindahl 2002; or Cohen, Soto 2007*)

* For detailed derivation of the model see Appendix B

Consequently from a growth perspective governments have to focus on an increase in higher education, while increasing average educational levels or decreasing the portion of people with only primary education is of low importance.

Wanting to increase tertiary education raises the question of how education levels are determined and how to influence them. One can approach this question viewing education as a very simple decision problem faced by all people in the labour force, where the years of education are chosen.

The present value of life-earnings τ of an individual are determined by the following equation

$$\tau = \omega_0(1 + t)^\beta \frac{1-(1+i)^{-(T-t)}}{i} - p \frac{1-(1+i)^{-t}}{i} \quad (8)$$

where $0 < \beta < 1$

At some point in time when mandatory schooling is completed, the potential worker can decide how many of her working age years T she will devote to education. For each year of additional education t the worker will receive higher wages in the future. ω_0 denotes wages without any additional schooling. The parameters β and c as well as the duration of working life T can be influenced by governmental action. Parameter i is a discount factor including the market interest rate as well as impatience of the workers and is not so easy to influence.

In this framework schooling exhibits decreasing returns, as it gets harder to acquire additional knowledge when the educational level rises. This holds trivially, it is easier to learn counting than advanced mathematics. The bigger β , the higher *ceteris paribus* the increase in salary for additional schooling. β therefore also captures the quality of education, because the more and the better skills are gained for one additional year of education, the higher the expected return. This means, if a government manages to increase the quality of schooling, average years of schooling should increase as well (as long as this enhanced quality is also reflected in the returns to education). But it is to be

kept in mind, that here an overall quality increase is envisaged and differences in return between different types of education are not explicitly modelled. Also, there may also be cases where better quality is not transferred into higher wages due to imperfect information.

Although there are empirical findings that suggest, that the most important role in the education decision is played by the returns to schooling (*cf. Fredriksson 1997*), the negative part of the equation is much easier to influence by governmental action. The annual costs of education p depend upon fees alone (as the foregone profits are taken into account on the left side of the equation) but can be lowered via financial support for students or indirect payment of tuition fees (like for example in Austria). Therefore they can easily be influenced by any government through financial transfers to students or educational institutions.

We can conclude that

improved quality of education can make it beneficiary for individuals to increase schooling, due to higher returns; but the easiest way for governments to attempt to increase schooling is by lowering the costs through financial transfers.

Concerning incentives for higher education, attempting to increase the quality of education may be a way to go for governments, although only if they find a method to ensure that this really leads to an increase in expected future earnings, which seems to be relatively hard. A way of directly setting incentives for higher education is by transfers to students in tertiary education programs, for example by offering scholarships or subsidizing tuition fees.

In connection with education the meaningfulness of minimum wages is also to be assessed. The introduction of a minimum wage in the economy will influence some person's education decision. There will be people for whom immediately starting to work will be better than further education. This holds for individuals for whom getting the minimum wage for T periods yields a higher benefit than the respective wage for their optimal amount of schooling for $T-t^*$ periods. Therefore, also some people who could get a higher than minimum wage would not invest in education due to shorter working life and

costs of education. This also implies that there would be a gap in education. There would be people without additional education and some with a large number of additional years of education (namely those, whose expected life-time earnings are above a life-long minimum wage earner), but nobody would have a medium amount of education. Therefore, although minimum wages may have some justification from a social policy point of view, it is questionable that they are a suitable tool for any growth enhancing policy.

This again casts doubt, whether it is really advisable to combine the goal of growth with those of social equality and/or high employment rates.

Despite the importance of labour productivity for economic growth, the macroeconomic policy is not to be forgotten, as it lays the fundament upon which the economy operates. In this field, two factors are critical for economic growth. First of all macroeconomic stability (alongside reliable financial institutions) is needed in order to make long-run economic growth attainable, as otherwise consistent forecasts are impossible to make for economic agents, which most likely will keep them from investing into the (then very uncertain) future. However, sometimes this will not be enough to ensure that investments that are needed in order to sustain long-run growth are made. Liquidity shocks can lead to such a situation, so that countercyclical policy can substantially increase long-run growth, as it circumvents liquidity shortages and thereby ensures that investments for the future can be made. (*cf. Aghion, Howitt 2006, p. 303-305*)

Therefore state actors have to find ways to ensure that in the case of a crisis they maintain their capacity to act. This makes sound public finances necessary, but at the same time is an argument against rigid rules concerning the growth of public debt.

Another component that promotes economic growth is foreign direct investment (FDI), as it provides further capital for the economy. (*cf. Azman-Saini, Law, Ahmad 2014*) However this effect cannot maintain increasing growth rates in the long-run, as on the one hand there is a limit to the amount of FDI and on the other hand the means to directly attract FDI are limited for governments.

I conclude my assessment of the most important driving factors of economic growth. I started my analysis by emphasising, that the clear link between employment rates and economic growth implicated in the design of the Lisbon strategy is not supported in theory. It is clear, that a higher employment rate *ceteris paribus* leads to a higher GDP per capita, however this is only a short-run effect. There is even evidence, that GDP growth has adverse effects on employment, rendering the European concept of creating jobs by growth absurd.

In line with most endogenous growth theories, I have argued, that long-run sustainable growth rates in GDP per capita can only be achieved by growth in productivity, even though capital accumulation also plays a role.

All endogenous growth theories that explicitly model productivity growth have in common, that the accumulation of knowledge is the reason for sustainable growth rates in the long-run. There is an optimal portion of investment into R&D that maximises growth rates in the long run. Therefore overinvestment is theoretically possible, but empirical evidence shows, that typically there is an underinvestment in the R&D sector, meaning there is room for a policy filling this gap. This can either be achieved by direct governmental investment in the R&D sector or by measures designed to foster private R&D investment.

However it is not clear, that knowledge or R&D is homogenous. Based on the work by Aghion and Howitt I argued that there is a substantial difference between knowledge needed for leading technological progress and a development for catching up. A finding that is also underlined by empirical evidence. There is a close link between R&D and skills acquired by education and countries close to the technology frontier, like the European Union, have to put emphasis on higher education as it is needed for the development of leading edge technology. In this context I argued, that concerning schooling it is important to set incentives that increase the benefits of increased education for workers.

4 European Growth Policy from an Economic Point of View

In this chapter I will at first confront the Lisbon Strategy with the theoretical evidence outlined in the previous chapter, thereby answering my research question whether the policy outlined in the Lisbon Strategy was suitable for enhancing growth within the European Union. Then I attempt to draw policy implications, starting with the question whether enhancing growth by policy is possible and if yes if the European level is a good choice of stage and in the end how a good growth policy (if one exists) should look like. Lastly I will briefly give an overview if some of the problems of the Lisbon Strategy were effectively tackled in the Europe 2020 Strategy.

4.1 Confronting the Lisbon Strategy with Theoretical Evidence

The first question to be asked when trying to assess if a growth strategy is good, meaning useful in fostering economic growth is whether it is in principle possible to do so. Therefore, is it possible for governments or other political institutions like the EU to influence economic growth in the long-run? Considering theoretical and empirical evidence of underinvestment in R&D or the possibilities for incentives for further education one may be inclined to say: “Yes, governments can influence long-run growth.”, and it is true, there are some things governments and other state actors can do in order to promote growth. However this answer is too simple as this is not the whole story. There are three points to be mentioned in this respect. First, it is highly questionable whether governments know the optimal levels of R&D or education, therefore there is the risk of overshooting the mark and thereby even impeding economic growth. Although it is theoretically possible to approach optimal levels by trial and error this may as well have a negative impact on growth (at least in the short run). Secondly, intervening in the market always leads to adjustment processes that may provoke counter effects. And third there is a natural end to fostering growth as soon as optimal levels are reached, meaning long-run growth is possible, although not at any desired rate. Therefore we will have to level our answer and say: “In principle governments can positively influence long-run growth, but neither for any desired level, nor is it easily done.” It may be, that the goals set by the European Union were just too ambitious considering that most of their member states are already near the

technology frontier. However the question here is whether in principle the Lisbon Strategy contained the right measures.

The next question is whether growth policy, if desired, should be conducted on the European level, or whether nation state or even regional level would lead to better results. On the one hand the member states of the European Union constitute a single market, on the other hand the European Union is quite homogenous in economic development.

Altogether action on the EU level seems to be the only possibility to influence growth out of two reasons. The first one is, that substantial changes can only be made if all member states contribute and some policies, like for example patent protection only work if enforced in all member states. The second points to a free-rider problem occurring when there is no joint action on the European level, namely as soon as a country invests into economic growth, for example by increased R&D activities all countries benefit, while the cost is only beard by the initiating country. Therefore there is an incentive to wait for others to take action in the field of growth policies.

On the other hand there is empirical evidence that regions within the European Union differ substantially. This means, that different regions have different capacity in transforming knowledge created by R&D activities into economic growth, therefore the effects of an increased investment in growth relevant activities are different for all regions. (*cf. Bilbao-Osorio, Rodríguez-Pose 2004; as well as Becker, Egger, von Ehrlich 2013*) This points to the necessity of adjusting policy measures to region specific characteristics, which leaves us with a counterargument to a unitary growth policy on the European level.

Leading to the finding that an effective growth policy has to find the right balance between collective measures and region specific characteristics. Within the Lisbon Strategy it was tried to incorporate this feature, when defining common goals that should be reached by actions of the nation state level. However whether the national plans where designed to tackle regional problems is to be doubted and some more coordination between states could have been conducted. Also the free-rider problem was not taken into account at all, as there was no mechanism included by which countries where forced to take action, or at least monitored thereby creating group pressure.

As already mentioned before every intervention in the market has multiple effects. Therefore by including so many goals in the Lisbon Strategy in a plurality of policy fields most likely some measures where counteracting each other. Especially the inclusion of social policy into a growth policy strategy is highly questionable, as this leads to ineffectual or even adversarial measures. In the Lisbon Strategy measures on social inclusion as well as a call for welfare distribution are included, both things that may be of importance from a political point of view, but are not relevant for a growth strategy, on the contrary measures designed for social inclusion may even hinder economic growth. This is also detectable in the strategy for the development of human capital, where some measures are designed to increase inequality, while for the fostering of economic growth other measures would be by far more effective. (*cf. European Parliament*)

In this respect the strong positive relation between economic growth and employment assumed by European policy makers is to be mentioned as well (*cf. European Parliament*). Economic theory suggests, that on the contrary productivity growth will most likely lead to an increase in unemployment. Therefore connecting growth policy with employment policy in this way is not supported, although one might see the need to counteract the adversarial effects the envisaged economic growth could have on employment.

The first goal of the Lisbon Strategy is to guarantee easy access to information technology for all people. (*cf. European Parliament*) This can be seen from two points of view, first of all as a means to connect the supply and the demand side of the labour market. In this respect it is an appropriate measure, although this will not trigger long-run growth. On the other hand this can be seen as a way of creating knowledge, as the access to information technology gives people the skills to use it, also in a working environment. However the effect is expected to be low, as this does hardly influence the higher education sector.

Another part of the Lisbon strategy is the establishment of a European Area of Research and Innovation. A goal that is envisaged to be achieved by ensuring the collaboration between research institutions within the Union, encouraging private investment in R&D and improving patent protection. (*cf. European Parliament*) The idea of ensuring the collaboration between research institutions seems to have its advantages, although it is

not clear, whether governments can influence that so much. Encouraging private investment in R&D is a key point, as emphasized in the previous chapter and therefore of high importance. The patent protection on the other hand is to be handled with care, as I have pointed out before too tight patent protection can even hinder economic growth for countries close to the technology frontier. Considering, that the EU already has a good patent protection further tightening is can have an adversarial effect. (cf. Aghion, Howitt 2006; p. 282-290)

To be seen in close interconnection with this is the next goal of “[c]reating a friendly environment for starting up and developing innovative businesses, especially SMEs”, which mainly aims at supporting start up’s, for example through financing possibilities. (cf. European Parliament) This measure stimulates competition and is therefore a good way of fostering economic growth. Especially as it should also help in transferring knowledge produced through R&D activities into an economic application. This is of high importance, empirical evidence shows, that in order for R&D activities to positively influence economic growth the transformation into market activity is key. (cf. Acs, Audretsch, Braunerhjelm, Carlsson 2004)

Then there is the target of a “fully operational internal market” included in the Lisbon Strategy. (cf. European Parliament) This has a twofold effect on economic growth, as it should increase competition on the one hand and lead to further gains from trade on the other hand, but from my perspective it still does not have to be included in a long-run growth strategy, as there will be some adjustments leading to a higher productivity, but not to a substantially higher productivity growth.

Point five on the list of targets of the Lisbon Strategy is to create “[e]fficient and integrated financial markets” (European Parliament) and is to be evaluated as positive as the financial market provides the basis for effective investments, (cf. Azman-Saini, Law, Ahmad 2014) but still this will not facilitate a long term increase in growth rates especially as the financial markets within the European Union are relatively well established.

The sixth goal is to “[c]oordinate macro-economic policies. This point is of importance for economic growth, as it sets the basis for economic growth. However the kind of macro-economic policy that is envisaged here is to be criticized. The focus within European policy lies mainly if not solely on the consolidation of public finances, as laid out in the Maastricht Criteria. Although in principle this could endow states with the financial means to conduct countercyclical policy in reality lower public debt levels and higher budgetary discipline are not prevalent, while in recession governments are less inclined to carry out public investment. (*cf. European Parliament*)

Then there are measures targeting human capital development. In this line, seventh on the list is a point about education and training. Here the European Union commits itself to substantially increasing per capita investment in human resources. As discussed before education is playing the major role for economic growth, but the European Union is in principle focusing on primary and secondary education. This will hinder the efficiency of the investments, as for countries close to the technology frontier increasing the portion of higher education has a positive effect on growth. Therefore although the increase in education is positive investing in tertiary education would be more useful from a growth perspective. (*cf. European Parliament*) This is also a case where social and growth considerations are mixed and thereby the effectiveness of the growth strategy is deterred.

The eighth point on the list is on employment. I have already elaborated that although there is a link between employment and growth, fighting unemployment will not lead to a sustainable increase in growth in the long run. (*cf. European Parliament*)

As previously told empirically we typically find an underinvestment in R&D activities. In this respect the goal of attracting private investment in this sector was included in the Lisbon Strategy. However, taking into account that typically this underinvestment occurs due to externalities it is questionable whether incentives for private investment will suffice in order to reach the optimal amount of R&D activities. Therefore additional governmental investment in R&D activities would be advisable.

For economies close to the technology frontier governments should aim at stressing leading edge innovation, rather than imitation of existing technology. This especially has implications for the education policy. In this area much more could be done within the Lisbon Strategy. The only measures taken aim mostly at primary and secondary education and therefore go in the wrong direction.

Within the Lisbon Strategy a tightening of patents is intended. This can have adversarial effects. Patent laws should not simply be tightened but their impacts assessed. In some cases decreasing the patent protection may even be favourable.

Concerning education setting incentives for more education is not explicitly considered. There is a commitment to increase investment in education. This will most probably aim at increasing the quality of education. As pointed out before this may, but does not necessarily, lead to higher returns to education and therefore constitute an incentive for further education. More financial support in order to reduce the costs of education is not considered, although this would be the most direct possibility for influencing education decisions of the workforce.

With the re-launch of the Lisbon Strategy in 2005 some of the problems were tackled – although not fully effectively – while there are still some points ignored. Only with the re-launch in 2005 a real community layer was added to the strategy, thereby completely overlooking possibilities of directly influencing growth through measures at the European level. In connection with that there was also an attempt of tackling the free-rider problem. Countries were to provide a document stating their plan of action for the reaching of the Lisbon goals, in order for the European Commission to be able to assess the progress made. However no clear goals for countries were set on the European level, so that in principle one could have declared goals one either wanted to or was sure to reach anyways. In addition the only possible way of sanctioning not to collaborate in reaching the targets was naming and shaming.

A positive aspect of the re-launch of the Lisbon Strategy was that goals were tightened, such that the strategy was only focussing on growth and employment and that clearer

measures were lined out. But still the strategy was somewhat blurry. Although the focus should have been on growth and jobs social policy measures were included. Education policy was still mixed with social policy, so that investment in human capital was again in principal focussed on primary education. Although one can raise the question whether reducing drop-out rates tackles the problem of unemployment, it is still to be criticized, that the two aspects of growth and jobs are not consistently divided. The importance of R&D and innovation is again emphasized, but once more no government investment in R&D is provided for.

Summing it up the first problem of the Lisbon Strategy is that it is no real growth strategy. There are a plurality of goals pursued within the Lisbon framework. On the one hand there is the goal of growth, but on the other hand considerations for jobs – where the interconnection is not straight forward – and social policy – where conflicts of interest can arise – are included as well.

Even though it is clear, that a commitment to fostering economic growth has to be made at the European level in order to be effective, differences in regions have to be taken into account as well. Although in this respect it is a sound decision to pursue the goals on the nation state level a free-rider problem arises, as no liability for reaching well defined goals are defined for the member states.

The importance of macro-policy is taken into account, but measures taken are not consistently compatible with the desired long-run growth. The establishment of well-functioning financial institutions are to be appreciated the emphasise put on pursuing budgetary discipline have in practice proved to be adversarial to growth enhancing policies. In order to tackle liquidity shocks more flexibility would be needed.

A very positive point is that one focus is the R&D sector, which is of high importance in order to foster growth. Setting incentives for private investment in R&D activities is a good lever for economic growth, however additional progress could be made by also ensuring governmental investment in the sector as there are externalities preventing private investment from reaching the optimal level that may not be completely removed by the incentives envisaged.

For human capital investment more or less the same holds true. Human capital is of high importance, but investments in human capital could be used much more effectively if the focus would not be on primary and secondary education, as for countries at the technology frontier a shift to higher education increases productivity growth.

In one sentence it seems that on the European level there is no real commitment to growth, and policies are always blurred as multiple goals are pursued at the same time.

4.2 Policy Implications

Again it is surely possible to influence economic growth by appropriate policy measures. However it is not so simple that one can simply shift money to the right application and growth rates accelerate. Additionally one cannot simply choose any desired growth rate and achieve it. In that respect goals have to be reasonable and the right time-framework has to be chosen. If the goal is to foster growth, mixing growth policy with other policies will most likely lead to inferior results. Measures should not be blurred by pursuing multiple goals at once. If the goal is to reach higher employment rates, pursuing growth enhancing policies is not the right way to go.

If progress in terms of reaching goals shall be made it is necessary that no free-rider problem occurs. Therefore goals have to be well-defined and their achievement easily checked. Taking into account the differences in characteristics across regions, targets should be defined at the national as well as the regional levels, but due to free riding decided upon at the European level. At best there should be an automatic penalty included when targets are missed, however due to the problems outlined above these targets should be in the fields of investment in R&D or education, but not the growth rates.

Accounting for differences in regions and their capacity to transform investment or R&D into growth measures should be adapted to the needs of the regions rather than applying a one-fits-all approach.

As outlined above the two most important factors for economic growth are R&D and innovation on the one hand and human capital formation on the other hand. Therefore the focus of growth policy should lie on these two areas.

Concerning research and development there is potential for effective governmental intervention, as typically underinvestment is found, as shown in empirical studies. (*cf. Jones, Williams 2000*) Therefore incentives for private investment in the Research and Development sector are desirable and should be accompanied by governmental investment in R&D activities, as externalities exist. Also typically R&D conducted by governments also involve an educational component and therefore is of high importance for fostering economic growth.

However investing in the R&D sector alone will not suffice. In order for knowledge produced to facilitate higher growth rates, it has to be transferred to an economic application. (*cf. Acs, Audretsch, Braunerhjelm, Carlsson 2004*) This aspect points to another connection between successful R&D activities and appropriate education. In addition it is necessary to create an environment favourable to new businesses. Convenient measures therefore would be tax cuts or favourable financing opportunities for start-ups.

Another point of high importance with respect to R&D is the difference between countries at the technology frontier and those far away from it. For countries far away development for catching up is needed, while countries close to the technology frontier grow by developing new leading edge technologies. Therefore for the European Union the focus has to lie on the second. While in countries far away from the technology frontier competition can have a discouraging effect on innovation activities in countries close to the frontier it is needed for development. This is another reason to emphasise firm's possibilities to enter the market. In this regard patent laws must exist and be enforceable but they should not be overly tight in order not to hinder innovation.

As pointed out human capital is to be seen in close connection to the before mentioned R&D activities. Theory as well as empirical evidence suggest, that for imitation other skills

are needed than for innovation. (*cf. Aghion, Howitt 2006; and Becker, Hornung, Woessmann 2011*) Therefore in advanced countries focus should lie on higher education. This leads to the conclusion, that a European growth policy should include additional investment into education on the higher levels.

But not only should investment in higher education take place, but in order to ensure higher levels of tertiary education incentives for the potential workers have to be set. As described in a previous chapter this can be done by financial support for people in education. However another very important factor lies in the expected increase in wages. (*cf. Fredriksson 1997*) In connection with that taxation plays an important role, as progressive taxation dilutes the benefits of further education. Here again growth policy collides with social policy considerations.

Other measures should be taken, designed to establish a sound basis for economic development. These however are not directly increasing growth rates. Thereto belongs the establishment of a reliable financial system that facilitates the means to make investments. In connection with that there is also the idea of attracting foreign direct investment, which is favourable to high growth rates.

But a lot more important is a good macro-policy. In recession's liquidity shocks can occur, such that innovation that is needed for long-run economic growth cannot be financed, thereby damaging the economy for the future, therefore countercyclical macro-policy can counteract this negative effects and thereby help to create sustainable growth. However this does not mean that recessions could or should be avoided by such a policy. (*cf. Aghion, Howitt 2006*) In order to render such countercyclical governmental action budgets have to be flexible. Therefore the idea pursued by the Maastricht Criteria, namely to create flexibility through budgetary discipline in times of prosperity, is not to dismiss, however mechanisms have to be found such that in case of recessions flexibility is ensured and governmental investments are even supported.

In a nutshell an effective growth policy on the European level would need a macro-economic policy designed to react flexibly to shocks and a stable financial system

as basis. Clear goals would have to be defined on the European level that are not mixed with social policy considerations and with targets defined for the national or even regional level. In the process the free-rider problem has to be circumvented by applying adequate procedures for monitoring as well as punishment. The government should provide for additional investment in the R&D sector in order to prevent underinvestment in the sector. Thereby innovation is facilitated, however in order for this to foster economic growth it has to be applied economically. Patent laws are necessary to create incentives for R&D activities, but must not be too strong, as competition is needed as well when a country is near the technology frontier. In this regard conditions favourable for new entrants into the markets have to be developed, for example by supporting start-ups. Another important part is the development of human capital. In this area it is important to note, that for developing leading edge technology especially higher education is needed, therefore growth policy should focus on promoting this kind of education. For doing so incentives for potential workers play a key role and have to be taken into consideration.

4.3 Outlook – Europe 2020 and the Future of European Growth Policy

In 2010 the European Union has launched its new growth strategy for the following 10 years, the Europe 2020 strategy. The question is what has really changed, is the strategy more useful than the Lisbon Strategy and is a success to be expected of this new strategy.

Contrary to the Lisbon Strategy the goals are clearly lined out in the Europe 2020 strategy. They are 75 % employment for the age group between 20 and 64 years, 3 % of GDP invested in R&D, a 20 % reduction in greenhouse gas emissions compared to 1990, 20 % of energy from renewable resources, a 20 % increase in energy efficiency, a rate of early school leaving below 10%, in the age group between 30 and 34 years at least 40 % with completed third level education and at least 20 million fewer people in or at risk of poverty and social exclusion. (*cf. European Commission (f), p. 32*)

Although the goals may suggest otherwise, the Europe 2020 strategy is explicitly stated to be “a growth model for the future” and about the goals it is said, that “[t]hey are not ends in themselves but rather a guide for growth policies”. (*cf. European Commission (e)*)

Aside from the stating of very clear and checkable goals within the Europe 2020 strategy these goals were slightly adjusted and the procedure has changed in comparison to the Lisbon Strategy. An exact goal regarding the envisaged GDP growth is no longer included in the 2020 strategy, while the goal of 3 % of GDP invested in R&D is carried on from the re-launch of the Lisbon Strategy. In the area of education the goals are diversified also including tertiary education now. Social policy and employment goals are still included and goals on renewable energy and climate protection were added. Regarding the procedure competences are much clearer within Europe 2020 compared to the Lisbon Strategy. The headline targets for the European Union are transformed into national targets for each member state. Every country annually has to submit a national reform program on how it will achieve its national targets. These programs are evaluated by the European Commission and policy recommendation or if necessary warnings are issued for each country. In addition the European Committee of the Regions is more closely involved in the process than within the Lisbon Strategy. (*cf. European Commission (f), p. 29-32*)

Changes in implementation are positive, as the free-rider incentive is lowered by issuing country specific goals, moreover their achievement is monitored on an annual basis, however it is not clear whether this will be enough to prevent countries from disregarding their commitments to the goals, as again no possibility for punishment is included.

On the macro-economic policy level the focus still lies primarily on the goals agreed upon in the Stability and Growth Pact and the need for a more flexible policy in order to be able to tackle liquidity shocks is not taken into consideration.

The goals are streamlined by concentrating the strategy on five headline targets – although including sub-goals, such that in the end there are eight main targets – and defining them in a way that makes it possible to check whether they are reached. The goal of reaching 3 % GDP growth of the Lisbon Strategy was not included in Europe 2020. On the one hand that is positive, as it is highly questionable whether one can arbitrarily set a desired growth rate and reach it by political measures; on the other hand as no growth goal is defined the need to check whether the strategy is really enhancing growth is no longer provided for within the framework of the strategy.

Again growth considerations are mixed with social policy goals as well as employment considerations, a practice that remains questionable regarding the effectiveness of the growth strategy. Additionally goals on green economy and sustainable development are more clearly defined and emphasized in the Europe 2020 strategy. Some of these goals may well be considered as shifting the European Union towards a more efficient technology level in the long run, although it is questionable whether reducing emissions really belongs in this line and should be included in the growth strategy.

Measures are again primarily taken on the national level. The close collaboration with the European Committee of the Region within Europe 2020 is an improvement compared to the Lisbon Strategy, however still more emphasis could be put on regional differences.

In the sector of research and development the target is very clear and should theoretically be promotional to growth, however some more consideration could be given to the question of transforming produced knowledge into an economic usage besides from supporting small and medium enterprises (SMEs).

In the field of education a substantial shift in priorities was made. While in the framework of the Lisbon Strategy the focus solely lied on primary and secondary education, the headline target on education of the Europe 2020 Strategy also includes a goal explicitly focussed on tertiary education. Even though the goal on a reduction in early school leavers already included in the Lisbon Strategy is carried on to Europe 2020, from a growth perspective the new interest in promoting tertiary education as well is a very positive development. The only remark to be made thereto is, that the social policy measures for fighting poverty should be carried out carefully in order not to being discouraging to further education for potential workers.

All in all deriving from economic theory one can expect the Europe 2020 Strategy to be more growth enhancing than the Lisbon Strategy, although empirically this can hardly be tested as changes are made continuously and the strategy is aimed at long-run growth. Only the targets themselves are easily evaluated. What can be said is, that the goals in connection to education will most likely be reached. Concerning tertiary education the

completion rate in the age group of 30 to 34 years has already increased from 33.4 % in 2010 to 36.8 % in 2013. The investment in R&D is still relatively low and lies far below the envisaged goal of 3 % of GDP and has only risen very moderately still being about 2 % of GDP. (*cf. Eurostat*)

Another main drawback is, that the transformation from European to national targets is not done at the European level. National targets are set by the national governments in their reform programs, this leads to the problem, that the reached national targets added up will have the European Union ending up with not reaching the headline targets, as national targets are not set ambitiously enough. (*cf. European Commission (g)*)

Summing it up improvements have been made in the Europe 2020 Strategy compared to the Lisbon Strategy. Goals were streamlined and are easily checkable. The procedure is as well designed to facilitate means of monitoring the progress on the national as well as the supranational level. The European Union has moved away from the idea that any desired growth rate can be facilitated and towards improving the system and regional specifics are, at least to some extent, taken into account. There is a clear commitment to augment investments in the R&D sector. In the area of education higher education is now also included in the strategy.

However the strategy is still mixing up growth considerations with social policy desires and therefore most likely measures will not be consistent from a growth point of view. Also the free-rider problem is not entirely solved, as the national targets are set by local governments, and again no possibilities for punishment are included in the strategy. Also more thought could be given to the question of how to transfer knowledge into an economic application.

Economically the new strategy is not too bad, although it remains to be doubted whether these measures can enhance growth rates substantially within only ten years. Politically the Strategy is still lacking the means of enforcement.

5 Summary and Concluding Remarks

In 2000 with the Lisbon Strategy the European Union launched a growth strategy in order

“to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion“

(European Parliament).

The goal was ambitious and it was clearly missed, the GDP growth rate was not even close to 3 %. That the strategy failed is easily discovered, but the reasons for this failure are less clear. Whether it was due to the lack of political commitment of the member states, the wrong means of promoting growth or the general impossibility of doing so is rather hard to tell.

Consulting economic theory regarding the main driving forces of growth has let me draw the following conclusions (see *chapter 3*):

In advanced countries a negative relation between employment and growth is to be expected which led me to the finding that trying to pursue employment goals through growth policy is not useful. Only it may be necessary to counteract the negative effects that (an effective) growth policy may have.

In the R&D sector underinvestment is to be expected due to externalities. This finding is also backed by empirical investigation. Therefore a government intervention shifting resources to R&D should be growth enhancing in the long-run.

Theoretical predictions as well as empirical findings indicate, that the closer an economy to the technology frontier, the more effective we expect policies aiming at leading-edge innovation to be in comparison to imitation of existing technology.

Effective patent law must be in place in order to promote innovation; however for a country close to the technology frontier over-protection can easily get

problematic, as in this position competition is promoting innovation. Therefore it is of high importance to find the right balance between protection and competition.

Concerning education it is expected, that for countries close to the technology frontier investment in higher education has higher returns in productivity growth than investment in primary and secondary education.

Increasing education can possibly be achieved through two different channels. Improved quality of education can make it beneficiary for individuals to increase schooling, due to higher returns; but the easiest way for governments to attempt to increase schooling is by lowering the costs through financial transfers.

Evaluating the Lisbon Strategy with reference to this I found that the strategies' first problem is that it is not only about growth, but encompasses a plurality of goals, some of which can easily be in conflict with growth considerations. This holds especially for social as well as for employment considerations. Also there was a substantial free-rider problem not taken into consideration in the implementation of the strategy. Regarding macro-policy a lack in flexibility to react to liquidity shocks due to the standards set in the Stability and Growth Pact is observed. The commitment to enhance investment however is likely to support productivity growth. While in principle increasing education levels is a convenient means to promote economic growth the focus was on primary and secondary education – most probably due to social and employment considerations – instead of higher education. In the course of the midterm review process the Lisbon Strategy was re-launched, but apart from some evaluation instruments added no substantial changes were added.

The Strategy following Lisbon was the Europe 2020 Strategy. In this framework goals were streamlined, but still there was a mix between growth and social policy. The targets were broken down to the national level, making it possible to assess whether nations meet their obligations, however the free-rider problem persists, although diminished. In the field of education now also the promotion of higher education was included. From my perspective the Europe 2020 Strategy is a little more appropriate for promoting economic growth in the European Union than was the Lisbon Strategy. Therefore it will be interesting to follow up on the achievements by the Europe 2020 Strategy.

Coming back to my research question whether the Lisbon Strategy was suitable for enhancing growth within the European Union, the answer has to be no, but some basics were reasonable as it focussed amongst others on R&D and education, which I identified as the main driving forces of economic growth.

With regard to the related question whether policies can effectively stimulate economic growth the evidence is mixed. That is, it is surely possible to create an environment more favourable to growth and thereby enhancing growth prospects, but one cannot just set any desired growth objective, shift some money in the right direction and thereby reach it.

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Appendix A - Statistics

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27	25.3	25.7	26.3	26.7	27.2	28.0	28.5	29.0	29.4	29.9	30.3	31.0	31.4	31.3	30.8	31.5
USA	32.2	33.0	33.5	34.2	35.2	36.2	37.0	38.1	39.4	40.4	41.1	41.5	41.9	42.2	43.1	

Tab. 1: labour productivity (Euro per hour work)

(source: Eurostat)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27		1.4	2.2	1.6	2.0	3.0	1.7	1.7	1.6	1.7	1.3	2.1	1.5	-0.5	-1.5	2.4
USA	0.2	2.5	1.5	2.3	2.8	2.7	2.2	3.1	3.4	2.6	1.8	0.9	1.1	0.6	2.2	

Tab. 2: percentage change in labour productivity with respect to previous period

(source: Eurostat)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27		1.9	2.8	2.9	2.9	3.9	2.0	1.3	1.5	2.6	2.2	3.4	3.2	0.4	-4.5	2.0
USA	2.7	3.8	4.5	4.4	4.8	4.1	0.9	1.8	2.8	3.8	3.4	2.7	1.8	-0.3	-2.8	2.5

Tab. 3: real GDP growth

(source: Eurostat)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27	1.79	1.78	1.77	1.78	1.84	1.85	1.87	1.87	1.86	1.83	1.82	1.84	1.84	1.91	2.01	2.01
USA*	2.40	2.44	2.47	2.50	2.54	2.61	2.62	2.52	2.52	2.45	2.49	2.55	2.62	2.76	2.81	2.73

Tab. 4: investment in R&D as percentage of GDP (* USA uses a different definition)

(source: Eurostat)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27					4.86	4.91	4.99	5.10	5.15	5.06	5.04	5.03	4.95	5.07	5.41	5.44
USA	4.56	4.90	4.92	4.94	5.23	4.94	5.55	5.49	5.61	5.32	5.09	5.43	5.31	5.42	5.47	5.49

Tab. 5: spending on education as percentage of GDP

(source: Eurostat)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27	17.6	17.2	17.0	16.5	16.1	15.8	15.5	15.0	14.8	14.3	14.0

Tab. 6: percentage of early leavers from education and training (age 18-24)

(source: Eurostat)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU 27 total	60.7	61.2	61.8	62.2	62.6	62.4	62.6	63.0	63.4	64.4	65.3	65.8	64.5	64.1
EU 27 women	51.4	52.0	53.0	53.7	54.3	54.4	54.9	55.5	56.1	57.2	58.2	58.9	58.4	58.2

Tab. 7: employment ratio (age 15-64)

(source: Eurostat)

Appendix B – Growth Model*

Technology:

$$Y_{it} = A_{it}^{1-\alpha} K_{it}^{\alpha} \xrightarrow{\text{due to symmetry}} Y_t = A_t^{1-\alpha} K_t^{\alpha} \quad (1)$$

Law of motion for A_t :

$$A_{t+1} - A_t = \mu_n(\gamma - 1)A_t + \mu_m(\bar{A}_t - A_t) \quad (2)$$

Growth rate of A :

$$g_t(A_t) = \frac{A_{t+1} - A_t}{A_t} = \frac{\mu_n(\gamma - 1)A_t + \mu_m(\bar{A}_t - A_t)}{A_t} = \mu_n(\gamma - 1) + \mu_m\left(\frac{\bar{A}_t}{A_t} - 1\right)$$

$$a_t := \frac{A_t}{\bar{A}_t} \Rightarrow g_t(A_t) = \mu_n(\gamma - 1) + \mu_m(a_t^{-1} - 1) \quad (3)$$

Profit of monopolist in industry i :

$$\pi_{it} = \delta A_{it}$$

Marginal benefit from innovation where entrant shows up with probability p

$$v_{it} = E[\pi_{it}(\text{innovating})] - E[\pi_{it}(\text{non-innovating})]$$

- for a firm at the technology frontier ($A_{it} = \bar{A}_t$):

$$v_{it} = \delta A_{it} - [p * 0 + (1 - p)\delta A_{i,t-1}]$$

$$\text{as } \bar{A}_t = A_{it} = \mu_n(\gamma - 1)A_{i,t-1} + \mu_m(\bar{A}_{t-1} - A_{i,t-1}) + A_{i,t-1}$$

$$\xrightarrow{\mu_n=1} A_{it} = (\gamma - 1)\bar{A}_{t-1} + \bar{A}_{t-1} = \gamma\bar{A}_{t-1}$$

$$\rightarrow v_{it} = \delta\gamma\bar{A}_{t-1} - (1 - p)\delta\bar{A}_{t-1} = [\gamma - (1 - p)]\delta\bar{A}_{t-1} \quad (4)$$

Therefore: $p \uparrow v_{it} \uparrow$

- for a firm below the technology frontier ($A_{it} < \bar{A}_t$):

$$v_{it} = p * 0 + (1 - p)\delta A_{it} - [p * 0 + (1 - p)\delta A_{i,t-1}]$$

$$\text{as: } A_{it} = \mu_n(\gamma - 1)A_{i,t-1} + \mu_m(\bar{A}_{t-1} - A_{i,t-1}) + A_{i,t-1}$$

$$\xrightarrow{\mu_n=1, \mu_m=0} A_{it} = (\gamma - 1)A_{i,t-1} + A_{i,t-1} = \gamma A_{i,t-1}$$

$$\rightarrow v_{it} = (1 - p)\delta\gamma A_{i,t-1} - (1 - p)\delta A_{i,t-1} = (1 - p)\delta A_{i,t-1}(\gamma - 1) \quad (5)$$

Therefore: $p \uparrow v_{it} \downarrow$

* This is a re-derivation of the growth model presented in Aghion, Howitt 2006

Modelling μ_n and μ_m via human capital $h = u + s$:

$$\begin{aligned}
 \mu_n &:= \frac{\gamma}{\gamma-1} u_{nt}^\phi s_{nt}^{1-\phi} \quad \text{and} \quad \mu_m := \frac{\bar{A}_{t-1}}{\bar{A}_{t-1} - A_{t-1}} u_{mt}^\sigma s_{mt}^{1-\sigma} \quad \text{with } \sigma > \phi \\
 A_t - A_{t-1} &= \mu_n(\gamma - 1)A_{t-1} + \mu_m(\bar{A}_t - A_{t-1}) = \\
 &= \frac{\gamma}{\gamma-1} u_{nt}^\phi s_{nt}^{1-\phi} (\gamma - 1)A_{t-1} + \frac{\bar{A}_{t-1}}{\bar{A}_{t-1} - A_{t-1}} u_{mt}^\sigma s_{mt}^{1-\sigma} (\bar{A}_t - A_{t-1}) = \\
 &= \gamma u_{nt}^\phi s_{nt}^{1-\phi} A_{t-1} + u_{mt}^\sigma s_{mt}^{1-\sigma} \bar{A}_{t-1} \\
 &\Rightarrow \frac{A_t - A_{t-1}}{\bar{A}_{t-1}} = \gamma u_{nt}^\phi s_{nt}^{1-\phi} a + u_{mt}^\sigma s_{mt}^{1-\sigma}
 \end{aligned} \tag{6}$$

Producer's maximisation problem:

$$\max_{u_n, u_m, s_n, s_m} \pi = \delta(\gamma u_n^\phi s_n^{1-\phi} a + u_{mt}^\sigma s_{mt}^{1-\sigma}) - \omega_u(u_m + u_n) - \omega_s(u_s + u_s) \tag{7}$$

Conditions:

$$\begin{aligned}
 \frac{\partial \pi}{\partial u_n} &= \delta \gamma a \phi u_n^{\phi-1} s_n^{1-\phi} - \omega_u = 0 \\
 \Rightarrow \omega_u &= \delta \gamma a \phi \left(\frac{u_n}{s_n} \right)^{\phi-1}
 \end{aligned} \tag{A}$$

$$\begin{aligned}
 \frac{\partial \pi}{\partial u_m} &= \delta \sigma u_m^{\sigma-1} s_m^{1-\sigma} - \omega_u = 0 \\
 \Rightarrow \omega_u &= \delta \sigma \left(\frac{u_m}{s_m} \right)^{\sigma-1}
 \end{aligned} \tag{B}$$

$$\begin{aligned}
 \frac{\partial \pi}{\partial s_n} &= \delta \gamma a (1 - \phi) u_n^\phi s_n^{-\phi} - \omega_s = 0 \\
 \Rightarrow \omega_s &= \delta \gamma a (1 - \phi) \left(\frac{u_n}{s_n} \right)^\phi
 \end{aligned} \tag{C}$$

$$\begin{aligned}
 \frac{\partial \pi}{\partial s_m} &= \delta (1 - \sigma) u_m^\sigma s_m^{-\sigma} - \omega_s = 0 \\
 \Rightarrow \omega_s &= \delta (1 - \sigma) \left(\frac{u_m}{s_m} \right)^\sigma
 \end{aligned} \tag{D}$$

$$s = s_n + s_m \Rightarrow s_n = s - s_m \tag{E}$$

$$u = u_n + u_m \Rightarrow u_m = u - u_n \tag{F}$$

$$(A)+(B) \Rightarrow \delta \gamma a \phi \left(\frac{u_n}{s_n} \right)^{\phi-1} = \delta \sigma \left(\frac{u_m}{s_m} \right)^{\sigma-1}$$

$$\Rightarrow \frac{u_m}{s_m} = \left(\frac{\gamma a \phi}{\sigma} \right)^{\frac{1}{\sigma-1}} \left(\frac{u_n}{s_n} \right)^{\frac{\phi-1}{\sigma-1}} \tag{i}$$

$$\Rightarrow \frac{u_n}{s_n} = \left(\frac{\sigma}{\gamma a \phi} \right)^{\frac{1}{\phi-1}} \left(\frac{u_m}{s_m} \right)^{\frac{\sigma-1}{\phi-1}} \tag{ii}$$

$$\begin{aligned}
(C)+(D)+(i) &\Rightarrow \delta \gamma a (1 - \phi) \left(\frac{u_n}{s_n} \right)^\phi = \delta (1 - \sigma) \left[\left(\frac{\gamma a \phi}{\sigma} \right)^{\frac{1}{\sigma-1}} \left(\frac{u_n}{s_n} \right)^{\frac{\phi-1}{\sigma-1}} \right]^\sigma \\
&\Rightarrow \gamma a (1 - \phi) \left(\frac{u_n}{s_n} \right)^\phi = (1 - \sigma) \left(\frac{\gamma a \phi}{\sigma} \right)^{\frac{\sigma}{\sigma-1}} \left(\frac{u_n}{s_n} \right)^{\frac{\sigma(\phi-1)}{\sigma-1}} \Rightarrow (\gamma a)^{\frac{1}{1-\sigma}} \frac{1-\phi}{1-\sigma} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{1-\sigma}} = \left(\frac{u_n}{s_n} \right)^{\frac{\sigma-\phi}{1-\sigma}} \\
&\Rightarrow \frac{u_n}{s_n} = (\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \quad (iii)
\end{aligned}$$

$$\begin{aligned}
(C)+(D)+(ii) &\Rightarrow \delta \gamma a (1 - \phi) \left[\left(\frac{\sigma}{\gamma a \phi} \right)^{\frac{1}{\phi-1}} \left(\frac{u_m}{s_m} \right)^{\frac{\sigma-1}{\phi-1}} \right]^\phi = \delta (1 - \sigma) \left(\frac{u_m}{s_m} \right)^\sigma \\
&\Rightarrow \gamma a (1 - \phi) \left(\frac{\sigma}{\gamma a \phi} \right)^{\frac{\phi}{\phi-1}} \left(\frac{u_m}{s_m} \right)^{\frac{\phi(\sigma-1)}{\phi-1}} = (1 - \sigma) \left(\frac{u_m}{s_m} \right)^\sigma \Rightarrow (\gamma a)^{\frac{1}{1-\phi}} \frac{1-\phi}{1-\sigma} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{1-\phi}} = \left(\frac{u_m}{s_m} \right)^{\frac{\sigma-\phi}{1-\phi}} \\
&\Rightarrow \frac{u_m}{s_m} = (\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} \quad (iv)
\end{aligned}$$

$$\begin{aligned}
(iii)+(E) &\Rightarrow \frac{u_n}{s-s_m} = (\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \\
&\Rightarrow u_n = s \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \right] - s_m \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \right] \quad (v)
\end{aligned}$$

$$(iv)+(F) \Rightarrow \frac{u-u_n}{s_m} = (\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} \Rightarrow u - u_n = s_m \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} \right] \quad (vi)$$

$$\begin{aligned}
(vi)+(v) &\Rightarrow u - s \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \right] + s_m \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \right] = \\
&= s_m \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} \right] \Rightarrow u \left[(\gamma a)^{\frac{1}{\phi-\sigma}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\phi-\sigma}} \right] - s \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} = s_m \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} - s_m \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \\
&\Rightarrow u \left[(\gamma a)^{\frac{1}{\phi-\sigma}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\phi-\sigma}} \right] - s \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} = s_m \left[\left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} - \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \right] \\
&\Rightarrow \frac{u \left[(\gamma a)^{\frac{1}{\phi-\sigma}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\phi-\sigma}} \right] - s \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}}{\left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} - \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}} = s_m
\end{aligned}$$

$$\text{Substituting into (iv)} \Rightarrow (\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} \frac{u \left[(\gamma a)^{\frac{1}{\phi-\sigma}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\phi-\sigma}} \right] - s \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}}{\left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} - \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}} = u_m$$

$$\text{substituting into (E)} \Rightarrow s - \frac{u \left[(\gamma a)^{\frac{1}{\phi-\sigma}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\phi-\sigma}} \right] - s \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}}{\left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} - \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}} = s_n$$

substituting into (v) $\Rightarrow u_n = s \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \right] - \frac{u \left[(\gamma a)^{\frac{1}{\phi-\sigma}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\phi-\sigma}} \right] - s \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}}{\left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} - \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}}$

$$\left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \right] \Rightarrow (\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}} \left[s - \frac{u \left[(\gamma a)^{\frac{1}{\phi-\sigma}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\sigma}{\phi-\sigma}} \right] - s \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}}{\left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} - \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma}{\sigma-\phi}}} \right] = u_n$$

$$(B)+(iv) \Rightarrow \delta \sigma \left((\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} \right)^{\sigma-1} = \delta \sigma (\gamma a)^{\frac{\sigma-1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{(1-\phi)(\sigma-1)}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi(\sigma-1)}{\sigma-\phi}} = \omega_u$$

$$(D)+(iv) \Rightarrow \delta(1-\sigma) \left[(\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}} \right]^{\sigma} = \delta(1-\sigma) (\gamma a)^{\frac{\sigma}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{\sigma(1-\phi)}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\sigma\phi}{\sigma-\phi}} = \omega_s$$

$$\frac{\omega_s}{\omega_u} = \frac{1-\sigma}{\sigma} (\gamma a)^{\frac{1}{\sigma-\phi}} \left(\frac{1-\phi}{1-\sigma} \right)^{\frac{1-\phi}{\sigma-\phi}} \left(\frac{\phi}{\sigma} \right)^{\frac{\phi}{\sigma-\phi}}$$

Abstract (English)

This paper attempts to address whether the growth policy of the EU is theoretically reasonable. Specifically it is an economic assessment of the Lisbon Strategy, including a short outlook on its follow up strategy the Europe 2020 strategy.

In 2000 the European Union had set itself some very ambitious goals to be reached by the year 2010. The goal was “*to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion*” (*European Parliament*) Empirically it failed disastrously. The aim of the present work is to show which underlying assumptions of the strategy were theoretically reasonable and where the strategy failed.

At first different models of endogenous growth theory are discussed in order to draw conclusions on what can stimulate economic growth. This first section also includes some empirical findings. Theory on the relationship between growth and employment, R&D and human capital, innovation, and education are included. This theoretical analysis leads to the finding that in order to enhance long-run economic growth one has to focus on investing in R&D as typically there is underinvestment, creating an environment favourable to innovation and education with special emphasis on higher education.

In a next step the Lisbon Strategy is assessed with regard to the theoretical findings. This leads to the conclusion, that there were some good ideas included in the strategy (although still some improvements could have been made), but the strategy suffered especially from a free-riding incentive for states on the one hand and the mixing of growth considerations with social considerations on the other hand.

Within the framework of Europe 2020 some changes were made that are likely to increase the effectiveness compared to the Lisbon Strategy. However altogether one has not to forget, that it is only possible to generate an environment favorable to growth, but not to just move the right lever and thereby achieving any arbitrary desired growth rate.

Abstract (deutsch)

Diese Arbeit sucht zu beantworten, ob die Wachstumspolitik der EU theoretisch sinnvoll ist. Genauer handelt es sich um eine ökonomische Analyse der Lissabon Strategie, inklusive einem kurzen Ausblick auf deren Nachfolgestrategie, die Europa 2020 Strategie.

Im Jahr 2000 hat die Europäische Union sich selbst bis 2010 sehr ambitionierte Ziele gesteckt. Ziel war es *“zum wettbewerbsfähigsten und dynamischsten wissensbasierten Wirtschaftsraum in der Welt zu [werden] [...] der fähig ist, ein dauerhaftes Wirtschaftswachstum mit mehr und besseren Arbeitsplätzen und einem größeren sozialen Zusammenhalt zu erzielen“* (Europäisches Parlament). Empirisch gesehen hat sie auf ganzer Linie versagt. Ziel dieser Arbeit ist aufzuzeigen, welche der der Strategie zugrunde liegenden Annahmen theoretisch begründet sind und woran die Strategie gescheitert ist.

Zunächst werden verschiedene Modelle der endogenen Wachstumstheorie behandelt, um Schlüsse zu ziehen wie Wirtschaftswachstum stimuliert werden kann. Dieser erste Teil beinhaltet auch einige empirische Ergebnisse. Theorien bezüglich dem Zusammenhang von Wachstum und Beschäftigung, F&E und Humankapital, Innovation, sowie Bildung werden hier behandelt. Diese theoretische Analyse führte zu dem Ergebnis, dass man, um langfristiges Wirtschaftswachstum zu fördern, den Fokus auf Investitionen in F&E, da hier typischerweise Unterinvestment vorherrscht; die Schaffung eines innovationsfreundlichen Umfelds; und Bildung mit besonderer Betonung der höheren Bildung legen muss.

In einem nächsten Schritt wird die Lissabon Strategie im Hinblick auf diese theoretischen Erkenntnisse untersucht. Dies führt zu der Schlussfolgerung, dass einige gute Ideen in der Strategie enthalten waren (auch wenn immer noch Verbesserungen möglich gewesen wären), die Strategie aber einerseits unter einem free-riding-Anreiz für Staaten und andererseits an der Vermischung von Wachstums- mit sozialen Überlegungen gelitten hat.

Im Rahmen von Europa 2020 wurden einige Änderungen vorgenommen, die wahrscheinlich die Effektivität gegenüber der Lissabon Strategie erhöhen werden. Dennoch, insgesamt darf man nicht vergessen, dass es lediglich möglich ist ein wachstumsfreundliches Umfeld zu schaffen, nicht jedoch einfach am richtigen Hebel zu ziehen und dadurch jegliche gewünschte Wachstumsrate zu erreichen.

Lebenslauf

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