

Enrich the Rich! (?)

Income Tax, Income Inequalities and Economic Growth

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Abstract

This paper examines the effects of an income tax cut on economic growth. The way it is examined is twofold; in part through an increased savings rate and in part through increased inequalities. The former one is considered a more direct effect of the tax cut whereas the last one is considered a more indirect effect. The income tax cut is investigated under the assumptions of the Solow growth model. The Solow growth model helps limit the different possible causational factors of economic growth. The result of this paper is that the cut in income tax fuels economic growth rates until the new equilibrium has been reached. Thus, there are no long term effects on economic growth. There are, however, long term effects on the level of output.

Key words: Income tax rate, Solow growth model, income inequalities, economic growth

Words: 8343

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1 Introduction

In this paper I examine the relationship between income tax rates and economic growth in a hypothetical western economy with progressive income taxes. I examine two ways tax rates might affect economic growth: in a more direct way through the investment rate and a more indirect way through increased inequalities. The main theories used in this paper to examine this relationship between income inequality and economic growth are the Kuznets curve; the Laffer curve¹ and the Solow growth model. The Kuznets curve is addressed to give background on the historical relationship between income inequalities and economic growth as well as to open up for more modern research based on the Kuznets curve. The Laffer curve is addressed to intuitively try and examine the relationship between tax rates on income and income generated by taxes. Having presented the Laffer curve connected research will be addressed as well in order to give a better understanding of the relationship of income taxes and economic growth.

Throughout this paper when theories are discussed and scrutinized, the intention is to raise relevant critique of the matter at hand. However, the main purpose of this brief paper is to examine the relationship of inequality and economic growth from an economic point-of-view. Without any intention to give a holistic answer the economic point-of-view becomes a reason for disregarding moral and ethical issues irrelevant for this economic perspective and placing them in the periphery. Thus, many otherwise relevant social issues may still be left unaddressed as the focus remains on the validity of the economic theory.

Examining the thesis the attempt is to give an unbiased and straightforward conclusion of the relationship. Also, I explicitly want to make it clear there is no intention of saying whether or not the results of this paper are desirable as implemented policies. Dealing with this issue of distributive economic policy and economic growth it is, of course, subject to normative approaches.

¹ The Laffer curve explains the connectivity of *personal income* tax rates in relation to tax revenues (Bender, 1984, p. 414).

Further, I obviously use numerous sources and critically assess the sources from a bias-perspective prior to utilizing them. However, having told of the approach the reader still needs to remain critical of any suspected bias in this paper.

The thesis examined is the following:

Decreasing the marginal income tax rates in an economy with progressive taxes ignites economic growth directly through increased investments and indirectly through increased income inequalities.

The purpose with this paper is, in more elaborated words, to examine the hypothesis above by utilizing research on income tax and economic growth under the assumptions of the Solow growth model. The model and the research are utilized in a hypothetical economy in which assumptions are made and the hypothesis is tested. By lowering the taxes on wages from current levels (which are estimated to be in a range where lower taxes would affect growth, this is discussed further on) investments will increase in tandem with the savings rate. Further, the lower income taxes in an economy with marginal taxes² must be that the wage differential between the richest socioeconomic segment of the population and the rest of society increases. The increased inequalities feature has been examined extensively in previous studies. One very influential academic on the subject is Simon Kuznets. The Kuznets curve examines the relationship between GDP growth and income inequality³. It is proposed that historically as GDP rises in a growth phase, wages begin to differentiate more. The ones with capital (be it human capital or real capital) become relatively richer to those with less capital at first but over time the rest of the economy catches up and inequality decreases. This correlation (or perhaps even causality) has been examined by Galor and Tsiddon (1996) among other academics. When studying the relationship of economic growth and wage differential the question of whether it would be possible to kick-start economic growth by reversing the historical correlation described by Kuznets comes to mind. In perhaps more incendiary words; could economic growth be ig-

² Which is assumed to be the case. Also, the economy is operating under a progressive tax system.

³ Note that the relevant issue is *income* inequalities rather than *wealth* inequalities. This is in accordance with the presented theories on taxes and growth as well as inequalities and growth.

nited by making the rich richer? The examination of the proposed reversed causality is to be viewed as a positivist one. So once more, no attempts are made to answer any normative questions on the matter (for a discussion on normative and positivist economics see, for example, *Public Finance*, S. Rosen – Gayer, 2010, p. 18–49; *Labor Economics*, J. Borjas, 2013, p. 8 f.). The attempt is to answer the hypothesis incendiary described above as promoting growth by making the rich richer.

1.1 Disposition

Following now is a section examining studies on inequalities and growth. The original Kuznets hypothesis is used as an introduction to the subject, where more contemporary research follows. The Kuznets curve is here used as an illustration for how academics have interpreted the relationship between income inequalities and economic growth. Following the section on inequalities is the section on taxes and growth. In this section the Laffer curve is used in a similar fashion to the Kuznets curve; as an illustrative tool explaining a conceivable connection. The Laffer curve illustrates how the relationship between tax proceeds and income tax rates is imagined. Problems with this curve are addressed along with relevant research on growth and income taxes. An important assumption is made in this section, namely that the hypothetical economy is thought to be in between the two optimal points on the Laffer curve, thus implying that lower taxes will affect economic growth. The next section is the Solow growth model. This section lays out a more overarching structure for the economy stating what effects certain actions in the economy will have. This section also explains why savings and investments are equated in this paper.

The fifth section explains in a more direct way how it is assumed income tax cuts affect the economy in this paper. The hypothesis of this paper is also illustrated in a flowchart and compared with the Kuznets hypothesis. This is followed by the conclusions of this paper and finally some concluding remarks where the results of this paper are compared with those of contemporary studies.

2 Income inequalities and economic growth

There have been many economists looking into the complex connectivity of income inequalities and economic growth. Their studies have yielded many results to consider, but unfortunately they are—as so often is the case in the field of economics—inconclusive. Voitchovsky, in her paper from 2005, lists a number of empirical studies on the subject that yield different results. They may differ in the setting of their respective study, or in their specific econometric method and some studies point one way while some studies point the other way. Voitchovsky's conclusion from listing these studies is that the debate on income inequalities and economic growth is an ongoing debate with no given answer (2005, p. 274). The reason for mentioning this here is that the inconclusive *empirical* results give that the *theoretical* answer to what explains this connection is still an open one. So with this paper the intent is not to add to this broad literature of empirical studies littered with econometric problems. Instead theory will be the guiding tool to attempt to give an answer to the hypothesis.

It ought to be noted, however, that a theoretical approach always is a delicate matter as it is inherent in theorizing that simplifying assumptions are made, assumptions that may cause problems. These problems are not to be shunned. Still, successful theorizing is of course doable. Solow eloquently put it like this:

All theory depends on assumptions which are not quite true. That is what makes it theory. The art of successful theorizing is to make the inevitable simplifying assumptions in such a way that the final results are not very sensitive. (Solow, 1956, p. 65)

In the following section previous studies of economic growth and income inequalities will be examined. To illustrate this connection of growth and inequalities the previous research starts with the Kuznets curve due to its influence to this day. Following are more contemporary academic responses to the Kuznets curve arguing what the connection between growth and inequalities may be in

present western economies. What the connection is between the two is still being debated and therefore the different views are presented.

2.1 Previous research on studies of growth and inequalities

This section will be addressing previous studies and assess the proposed theories on the causality of economic growth and income inequalities. Addressing this issue the Kuznets curve is relevant to consider as it has played a big part in birthing development economics and still continues to be an important reference point for academics to consider (Moran, 2005, p. 209 ff.). The Kuznets curve is concerned with long-run processes of economic development (as is this paper).

The curve below is illustrated based on the hypothesis Kuznets presented in his paper in 1955 in regard to economic growth and income inequalities (Acemoglu & Robinson, 2002, p. 183). The Kuznets hypothesis can be, in brevity, explained as an historical account of how western economies developed. The account by Kuznets focused on GDP growth in relation to income inequalities (Acemoglu & Robinson, 2002, p. 183). The Kuznets hypothesis is therefore depicted as a curve similar to an inverted U:



Addressing the Kuznets hypothesis is relevant when examining economic inequality and economic growth as I noted above. Moran expressed the following opinion on the Kuznets curve: “one of the most significant and consequential propositions in development academics and policy.” (2005, p. 209 f.). The sheer impact on the studies of inequalities and growth of the Kuznets curve in development economics is thus one reason for examining it in this paper.

Simon Kuznets’ original hypothesis—on the dynamics causing the stylized curve—is that the cause is the transition of the economy from an economy based on a strong agricultural sector to a strong industrialized sector, industrialization of the economy, in other words. Some important mechanics in Kuznets’ theory are urbanization and the growth of the urban population. In this transitional economy those with capital find opportunities to invest in and grow richer from and those with no or little capital moving to cities to find work are employed. As urbanization is undertaken in large numbers the labor force available for capital owners increases, more is produced and the economy grows. This is accompanied by increasing population growth rates due to increasing living standards yielding declining death rates (Kuznets, 1955, p. 9 ff.).

Kuznets’ hypothesis has been proven both accurate and inaccurate, depending in large on the geographical setting of the economy of the study. In other words, the theory Kuznets presented as an explanation for the stylized has been proven sensitive. It seems to have held true when explaining the economic growth pattern of European countries in particular, but lack descriptive power when observing South East Asian countries (Acemoglu - A. Robinson, p. 184; see *ibid* for references to articles proving the theory both right and wrong). In this paper it is, however, assumed the economy is a modern western one.

The mechanics at work explaining the connectivity of income inequalities and economic growth have been suggested to be very different. As is noted above Kuznets assumed the underlying mechanics were in the transition from an agricultural economy to an industrialized economy (Acemoglu - A. Robinson, 2002, p. 184). More contemporary approaches are addressed in the next section.

2.2 Contemporary research on inequalities and growth

The connection between economic growth and income inequalities, the hypothesis explaining the Kuznets curve, is still being debated. In the words of Moran once more: "Now nearly 50 years later, the theoretical and empirical standing of the [Kuznets] hypothesis is still ambiguous, controversial, and relevant." (2005, p. 210 [brackets added]). The Kuznets hypothesis is explained above, other hypotheses explaining the connection between income inequalities and economic growth will be brought forth below. The reason for presenting them in this fashion is that Kuznets presented the shoulders on which contemporary academics stand on.

If the Kuznets curve holds only when this transition Kuznets believed to be the catalyst is in play, it would lack any implications for future policies of modern western economies. However, as has been mentioned above the theory did at least seem to explain, in particular, the growth patterns of the western economies (Acemoglu - A. Robinson, 2002, p. 185) and the Kuznets curve has been examined by many academics that come up with different explanations for the connection. In other words they arrived at the conclusion that some other factors than the transition from an agricultural to an industrial economy are the key mechanics at play. One of these alternative theories presented by Lindert in 1986 is that the Kuznets curve is a result of "falling importance of income generated by land" (Acemoglu - A. Robinson, 2002, p. 185).

In accordance with the above there has been an analysis of the Kuznets hypothesis suggesting that there is a trade-off to be done between income equality and growth rates. The authors of that analysis state that there is a *negative* correlation between income inequality and growth rates. "It is, however, well known that inequality of income is negatively correlated with growth rates (e.g. Alesina and Rodrik 1994; Persson and Tabellini 1994; Perotti 1993; and Galor and Zang 1992)." (Galor - Tsiddon, 1996, p. 114).

Another adjacent theory is presented by Perotti who focus on how human capital accumulation happens through the political process (1993) (this explanation is also addressed briefly by Kuznets (1955, p. 17)). The essence of Perotti's sugges-

tion is that through the political system voter groups can get access to services—such as education—which enhances the group’s human capital, enhancing productivity and wages. This brings with it a decline in wage differentials in accordance with the assumed connectivity of productivity and wages.

As in Galor and Zeira (1993), in the absence of perfect capital markets those individuals whose post-tax income is below the cost of acquiring education will be unable to invest in human capital, and the next period will earn the same pre-tax income. By contrast, those who can afford the expenditure needed to obtain education will have a higher income. Perotti, 1993, p. 756.

Other conceivable suggestions to why income inequalities decline have been presented in the many studies on the Kuznets’ hypothesis. One is presented by Aghion & Bolton (1997) who make the case for a more trickle-down explanation. They see the equalizing factor being the investments of the rich translating into cheaper loans available to the poor which in turn allows them to participate for their own gain in the economy (Aghion & Bolton, 1997, pp. 151 ff.). This explanation can be connected to Perotti’s explanation of gradual accumulation of human capital. Cheap loans can obviously be an important factor in paying for education. Accumulating human capital would then raise productivity which in turn would raise wages.

The point of bringing forth this ambiguity as to what it is that is the underlying force of the Kuznets curve is that no consensus has been reached on what connectivity explains the Kuznets curve. As a consequence, the Kuznets curve may still hold to be valid, at least in the western economic setting, and deserves to be investigated and brought forth as an option explaining any current correlation, or at least connection, between income inequality and economic growth.

In summary of the above there is still no definite answer as to which theory best explains the stylized growth facts represented by the Kuznets curve.

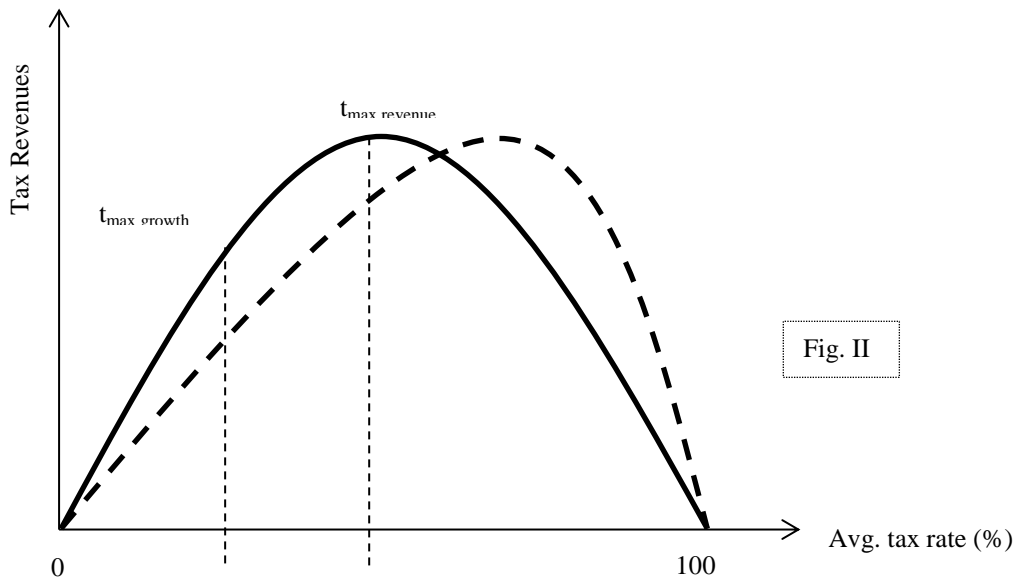
3 Taxes and growth

The tax rate in relation to economic growth is prone to vast amounts of research in the future, with loads of research already undertaken. The amount of research is due to its importance in our economy and as such it would be foolish to overlook taxes in relation to economic growth. The research already done is inconclusive⁴ (just as income inequalities and growth is) and this issue will therefore be addressed below. One very intuitive way to look at this connection will be examined as well as more in-depth ways of looking at the relationship. Below it will also be explained why lower taxes will yield greater income inequalities. This is done in order that assumptions on tax rate in relation to the investment ratio may be made for the hypothetical economy in this paper. This section will thus introduce the more direct effect of the tax rate on economic growth (investments) whereas the previous section introduced the more indirect effect tax rates affect economic growth (induce income inequalities).

3.1 Introducing the Laffer curve

One rather intuitive illustration of the relationship between tax revenues and marginal tax rates on income is the Laffer curve. On the Laffer curve there are two differing theoretical optimal points depending on what goal one wants to achieve. One point maximizes growth, and the other point maximizes revenues where $t_{\max \text{ growth}} < t_{\max \text{ revenue}}$.

⁴ Some of the relatively contemporary research is well summarized by Engen & Skinner in their paper from 1996. Academic papers are presented which come to different conclusions on whether or not tax reforms do have growth effects. The authors conclude that they do have noteworthy effects on growth.



The shape of the curve is given by the elasticity of labor with respect to net wage (S. Rosen & Gayer, int. ed. 2010, p. 423). This thus has to be estimated in order to draw the curve. There are, obviously, problems in estimating this elasticity and these problems show in the range of elasticities different economists reach. For examples of such studies on estimates of the elasticity, see Å. Hansson, 2004, p. 565 f. where earlier research on elasticity is presented. Keeping it short, there are many contributing factors affecting the elasticity (e.g. Hansson, 2004, p. 573) but the goal of this paper is certainly not to examine and evaluate the estimates. Simply concluding that the estimates are more or less accurate estimates is sufficient here. Problems with the accuracy of the estimates is also stressed by Hansson in her paper after producing and presenting her estimates (2004, p. 576). Thus, caution should be taken when stumbling upon any Laffer curve.

The more general implication that follows from the presented problems is that it is difficult to say anything about where any country would be placed on the curve which curvature is only an estimate. To the right, left or at the peak of the curve? At what tax rate is it beneficial to lower the tax rate? Laffer gives no answer to this in his original curve which was a reason for academics and politicians to disregard the theory when it was first presented (Burda & Wyplosz, 2013, p. 475). The reason for the lack of a definite curve has been presented above; the curvation depends on the elasticity of labor to the net wage. This must be estimated and there can thus be no definite curvation. Even estimating the elasticity of labor to the net wage for oneself is a rather tricky task. Aggregating the task to an

entire country or region is thus bound to be problematic. Also, it must be estimated for each country interested in using the Laffer curve. Further, the estimate should also be based on relatively recent information as any preferences of the workforce may very well change over time.

The economic effect [. . .] recognizes the positive impact that lower tax rates have on work, output, and employment—and thereby the tax base—by providing incentives to increase these activities. [. . .] A faster-growing economy means lower unemployment and higher incomes, resulting in reduced unemployment benefits and other social welfare programs. (Laffer, 2004, p. 2 f.).

If the Laffer curve is to be used in policies it is thus of importance to know where on the curve the economy is before adjusting any tax rates. Rates lowered from a tax rate currently to the right of the growth maximizing tax rate to the growth maximizing tax rate yields that revenues increase due to a higher growth stimulated by the excess capital being invested in the economy as a whole. This would create more jobs and an increased tax base which would yield larger or equally large revenues. It would thus also result in less *government* spending in social welfare programs such as unemployment support and similar social benefits (mentioned by Laffer in the quote above). When estimating where on the Laffer curve the United States currently is it a consensual opinion that the “overall elasticities are modest in size. It is safe to conclude that the economy is not operating to the right of [the peak]. ... However, some economists have estimated that European countries are actually quite close to the peak of the Laffer curve [Uhlig and Trabandt, 2006]” (S. Rosen & Gayer, int. ed. 2010, p. 424). Uhlig and Trabandt show both the labor tax and capital tax and their distance to the Laffer curve peak. EU-14 and the USA are all to the left of the peak regarding the income tax (2009 (rev. 2011), p. 28 f.). This further validates the assumption made in this paper that the economy is operating to the left of the revenue maximizing point.

It might be interesting to note some of the various attempts at concluding an income tax rate maximizing the revenues. Pecorino produces a model where he estimates this tax rate to be some 64% for a fictional economy (though it draws heavily upon estimates for the US economy) (1995, p. 535 ff.). In his paper Pecorino also acknowledges some estimates made previously by other economists;

Fullerton (1982) 78.8%, Stuart (1981) reaches 69% – 73% when estimating the revenue-maximizing rate for Sweden (see Pecorino, 1995, p. 535 for more). It is reasonable to assume there may be other more normative reasons than wanting economic growth for wanting lower taxes, such as preferring a smaller government (S. Rosen & Gayer, int. ed. 2010, p. 424). This discussion is, however, left out in this paper.

There is a potent risk worth mentioning with lowering taxes. The state would be forced to carry the risk of the previously taxed revenues ending up abroad. I.e. the reduced tax rate might lead to the now excess capital leaving the country rather than being invested to stimulate growth. This issue of capital flight is disregarded in this paper. Disregarding capital flight has previously been done by academics estimating real Laffer curves (Burda & Wyplosz, 2013, p. 475).

I assume the economy is near the left of the peak at which revenues are maximized. I.e. I assume in this paper that the economy is operating somewhere to the right of the growth maximizing point but close to the peak. This is a reasonable assumption as it correlates with estimates of modern western economies (S. Rosen & Gayer, int. ed. 2010, p. 424). Lowering the marginal taxes the economy thus moves from right to the left on the curve. The benefits that might follow from lowering the tax rates will require time before having trickled through the economy (Burda & Wyplosz, 2013, p. 484). However, lowering the taxes naturally instantly brings with it a smaller government budget. Thus, from a government's point of view, revenues decline instantly but the benefits will at best be reaped in the future. The state will thus either have to carry a deficit as a result, or lower government spending. Lowering government spending, however, can be a politically difficult policy to enact (ibid). As any positive effects might show over a time longer than a party/president is elected for it could very well be politically difficult to push through with it (see for example: Magazzino, 2012, pp. 320 ff.). However, the political idea of achieving a smaller government through lowered taxes has proven to be politically popular in some countries previously (Burda & Wyplosz, 2013, pp. 484 f.) where the expected economic benefits did not appear (e.g. under the Reagan administration (Magazzino, 2012)).

In this hypothetical economy I assume the government *does* in fact lower its spending.

These more direct effects are assumed to be true for the hypothetical economy of this paper⁵:

- The direct effect of a lower tax on income is that it discourages less from work seeing as the price of leisure now increases. Hours spent working in the aggregated economy therefore rises. In other words, incentives to work are strengthened with a lower income tax.
- The income tax cut encourages investments. On average the net income has risen with the income tax cut. The reason for investments (or rather savings, they are equated) to go up is assumed to be the uncertainty the future holds. Cut taxes today may be tax increases tomorrow. The individual is therefore assumed to save a fraction of the increased income to defend against future tax increases.

⁵ Engen & Skinner assume the same to be true when investigating the effects of taxes on economic growth. See pages 618 through 620 in particular.

4 The Solow growth model

The Solow growth model is a traditional model on economic growth also known as an exogenous growth model or the Solow–Swan growth model. The Solow growth model will be used to explain the overarching dynamics of the hypothetical economy. One such important assumption of the growth model is that each input (capital and labor) shows diminishing returns. This assumption is very important as it yields that per capita growth rates must cease over time given that technological advances are not made.⁶ In this paper the following assumptions of the Solow growth model (all of which may be found in Jones, 2002, chapter 2) are held to be true:

- $I = S$: This means the economy is closed. Also the only use of investments is to accumulate capital.
- The economy is at its equilibrium from start.
- It is equally attractive to hold wealth in the form of capital or loanable funds (Solow, 1956, p. 80 f.).
- The given production function of the Solow growth model contains capital and labor as input $Y = F(K, L)$ where both inputs correlate positively with output (Burda & Wyplosz, 2013, p. 68). This is expressed below in its intensive form of $y = f(k, l)$ where $y = \frac{Y}{L}$; $k = \frac{K}{L}$. Further, the production function is assumed to have the common Cobb-Douglas form $y = f(k, l) = K^\alpha L^{1-\alpha}$ where α is a number between 0 and 1. This production function yields constant returns to scale.
- The second important equation of the Solow growth model is the capital accumulation function. The intensive form is given by $\dot{k} = sy -$

⁶ The level of technology is exogenous in the Solow growth model.

$(n + d^7)k$ and it states that the change in the capital stock is a function of gross investments per person; the population growth rate and the depreciation rate. The population growth rate and the depreciation rate are negatively correlated with capital accumulation per person.

- Constant population growth rates (n) and constant depreciation of capital (δ).
- Investments *do* affect the growth of an economy (this controversy is discussed below).

Starting from the top the first assumption is that $I = S$, or rather investments equal saving. They are in other words considered to be identical. This assumption is important and how it is reached is therefore now explained. First off, private income can be described as a function of gross income minus taxes (Burda & Wyplosz, 2013, p. 36). This is a generalized way to describe private income and is often seen in the macroeconomic GDP identity⁸: $Y = C + I + G + X - Z$ (Burda & Wyplosz, 2013, p. 37). $Y = \text{GDP}$ and may be defined as: $C + S + T$. Inserting the new GDP definition into the identity yields: $C + S + T = C + I + G + X - Z$. Rearranging and thus eliminating consumption (as C is found as a positive constant on both sides of the equation): $(S - I) + (T - G) = (X - Z)$ (Burda & Wyplosz, 2013, p. 38 ff.). The national identity shows how investments (I) may be financed either through savings in the private sector (S); by the government budget surplus ($T - G$) or by the net exports ($X - Z$). Assuming the economy is at its steady state, or equilibrium, the following must be true: $T = G$; $X = Z$. This yields the result that $I = S$, and in words this means that investments are financed exclusively by domestic savings (Burda & Wyplosz, 2013, p. 61 f.). This conclusion will be used frequently.

The second assumption is that the economy is at its equilibrium. This is not a controversial assumption but rather a very common one to make when producing a modeled economy.

⁷ The symbols used for depreciation of capital are both δ (delta) and d .

⁸ GDP identity

The third assumption is that it is equally attractive to hold wealth as capital as it is to hold it as loanable funds. This is an assumption used mainly to make deductions from the model smoother (Solow, 1955, p. 80 f.).

The fourth assumption is one of two key equations of the Solow growth model and it shows that the model is based on a traditional neoclassical production function expressed in Cobb-Douglas terms. The function shows constant returns to scale and this is important and it means that if inputs are doubled then output is doubled (Jones, 2002, p. 22).

The fifth assumption is the second key equation and it is the equation showing how the economy accumulates capital *per worker*. This means that the population growth rates have a negative impact on capital accumulation (n). The depreciation of capital of course affects accumulation negatively as well. As can be seen the savings rate (s) is a positive term.

The next assumption made is that the economy has a constant population growth rate and a constant depreciation rate. This is not controversial and is intuitive. Capital does depreciate at a constant rate, anything else would seem odd. Population growth rates may certainly fluctuate over time. Exogenous shock such as war or a more endogenous shock as a radical culture revolution could certainly affect this assumption. It is, however, a rather insensitive assumption and no further time will be devoted to elaborating on this.

The final assumption made above is that investments do affect economic growth. Whether or not investments (national savings rate) actually have a major impact on economic growth is an ongoing discussion. The main features of this discussion on the importance of savings rate for economic growth are summarized by DeLong & Summers (1991). They argue in their paper that savings rate indeed is of crucial importance to economic growth (see pp. 484 ff. in particular). As I in this paper assume the Solow growth model as the theoretical foundation it follows that the savings rate is to be considered a key to economic growth.

Following now is a section addressing more directly how lowered income taxes will affect economic growth through increased investments but partly also due to the increased wage differential. This will be done under the assumptions explained above.

4.1 Illustrating an increase in the savings rate

In section 5 it is shown that lower taxes will yield a higher savings rate (increased investments). This increase in the savings rate yields an increase in capital (this is of course the increased investments) and is illustrated below in two figures, fig. III and fig. IV.

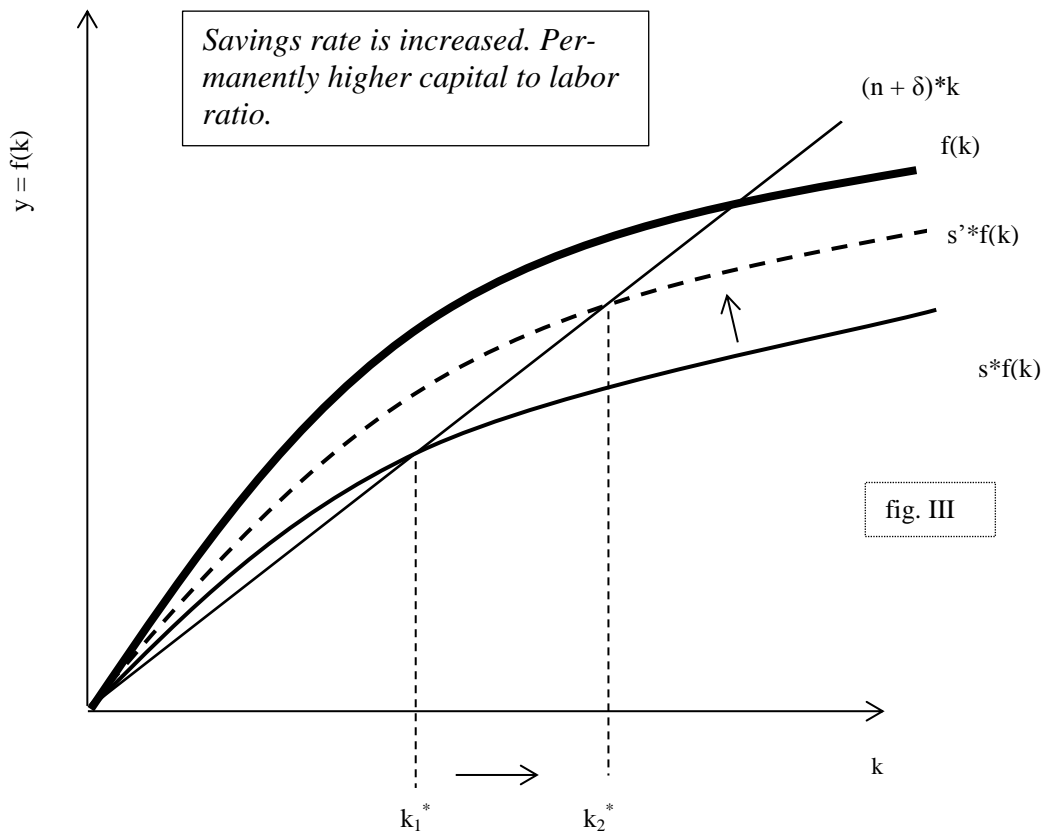
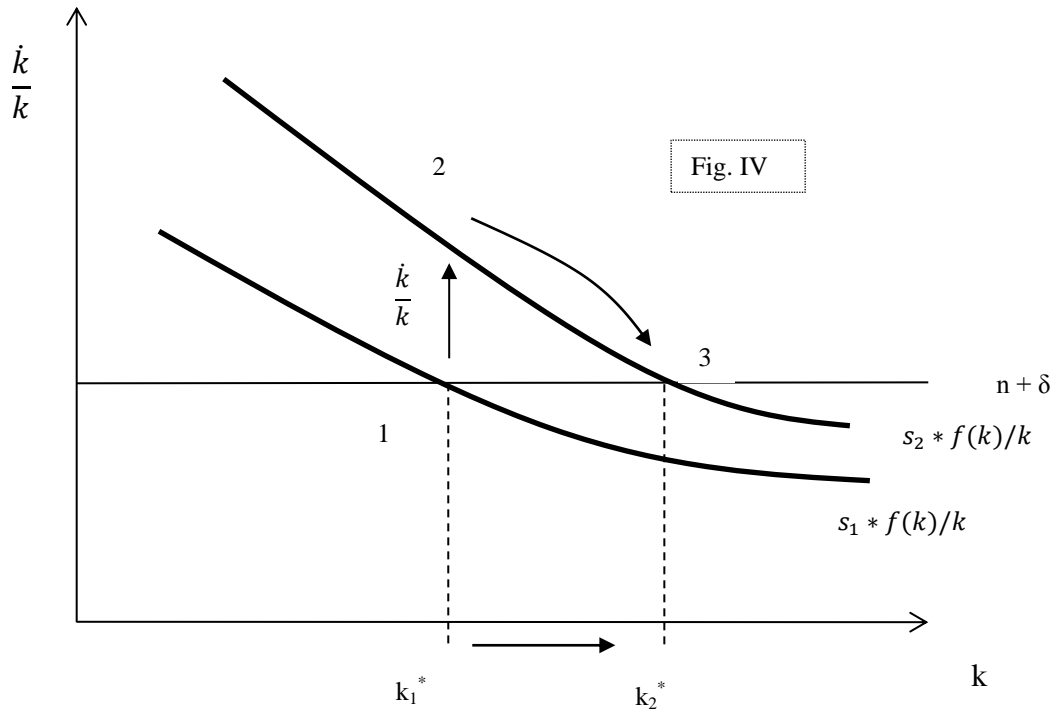


Figure III above illustrates the effect of an increased savings rate on accumulated capital and output. The curve shifts upwards, thus increasing the steady state level of capital. The economy's movement towards this new level of capital per person is better illustrated in the next figure, fig. III:



The assumption has been made that in the beginning the economy is in its steady state. This yields the capital level k_1^* . When the proportional income tax rates are lowered investments increase since individuals have a higher propensity to invest and I therefore assume the savings rate is permanently increased from s_1 to s_2 . This increase shows in the shift of the curve to the right. At point 1 the amount of investments made are larger than the depreciation rate of $n + \delta$ and thus the capital stock grows. More capital means more depreciation of capital and the capital stock grows until investments equal the total depreciation of the accumulated capital. This occurs at the intersection of the s_2 curve and the $n + \delta$ line (which is assumed to be constant) at point 3. Recall the output function stated above showing that when the capital stock grows the economy does too through increased output. This positive effect of an increased savings rate dampens as the capital stock approaches k_2^* . In more brevity the result is that a permanently increased savings rate yields a *temporary* effect on per capita growth rates (Barro & Sala-i-Martin, 1996, p. 24 f). I therefore assume that the new equilibrium is at a higher level of GDP, but with the same equilibrium growth rate as previously. That is, the new equilibrium growth rate would be the same as before whereas the level of GDP, however, would be higher.

5 Examining the effects of a lowered tax rate

5.1 Inequality as an engine for growth

The induced increase in wage differential is assumed to have a positive effect on economic growth in this paper. What mechanics would be at play causing this effect? The historical accounts of the connection between inequalities and economic growth show that those with capital have been able to earn more capital quicker, gain from an expansive economic growth period, better than those with less capital. Ceasing opportunities thus made the rich richer. In the fictional economy of this paper it is the other way around; taxes are lowered and the income equalizing effect of income taxes are diminished, the inequalities increase. This will render the already poor poorer and the rich richer in the short run. This is assumed to be the case because cuts in the government's budget are likely to, and indeed assumed to in this paper, directly affect the redistributive political programs such as unemployment benefits and other welfare programs⁹ commonplace in modern western economies. If the cuts in benefits or welfare programs are to be kept more unemployed citizens will be forced to take jobs. This would in effect increase the labor supply: "In fact, we can demonstrate that a welfare program that includes a cash grant and a tax on labor earnings *must* reduce hours of work" (Borjas, 2013, p. 57). Removing grants and benefits will make leisure (or rather unemployment) more expensive to the individual. The effect of increasing the price of leisure is increased hours of work in the aggregated economy and thus the labor supply increases (Borjas, 2013, p. 42 ff.).

In this paper I assume the hypothetical economy examined is operating under a democratic regime. This becomes important as one possible explanation for a

⁹ Assuming these programs are in place in this hypothetical economy is a non-controversial assumption as these programs are commonplace in contemporary western economies.

decrease in inequality could very well be the sheer size of those with low levels of capital as opposed to the small constellation of individuals with lots of capital. The size gives the group political power and may thus yield different benefits and pressure wage levels towards more equality.

The increase in labor supply that is assumed above has a positive effect on growth in the Solow growth model. This can easily be seen in the production function that is explained above. The function shows constant returns to scale, so in this simple model the increase in labor supply will show up as an equivalent increase in output.

In summary, the increase in inequalities will mainly fuel economic growth by making it more expensive not to work. Further, removing unemployment benefits and the benefits the like will work in the same way, making leisure – or unemployment – too costly.

5.2 Increased investments as an engine for growth

If the income tax is cut, will it necessarily increase the savings rate (and thus investments)? Solow eloquently addresses this question in his paper in the following way: “If a fraction v of the tax proceeds is invested and the rest consumed, the savings ratio changes to $s + (v - s)t$ which is larger or smaller than s according as the state invests a larger or smaller fraction of its income than the private economy.” (Solow, 1956, p. 89 f.)¹⁰ What Solow points out in this quote is that depending on the private economies’ propensity to consume and save, as opposed to the government’s propensity to consume and invest, an adjustment of income taxes either increases or decreases the effective savings rate. In other words, in order for the tax reduction to affect the savings rate in a positive direction private economies must have a higher propensity to save than the government (Solow, 1956, pp. 89 f.). It will be assumed hereafter that individuals do have a higher propensity to invest than the state does. In making this assumption a lower tax on income will increase the savings rate.

¹⁰ Where v = fraction of tax proceeds invested; s = savings rate; t = proportional income tax rate

5.3 Reversing the Kuznets hypothesis

In the array of assumptions made above it follows that a lowered income tax does fuel economic growth. In part the growth is fueled by increased inequalities and in part through an increased savings rate. This may be viewed almost as a reversal of the Kuznets hypothesis of causality between GDP growth and economic income inequality, where inequality follows in the wake of economic growth. The flowchart below is followed by an explanation.

Kuznets hypothesis

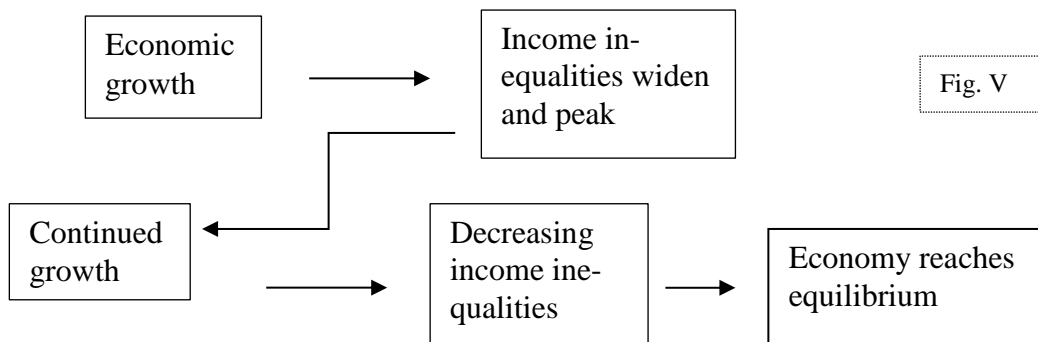


Fig. V

Hypothesis of this paper

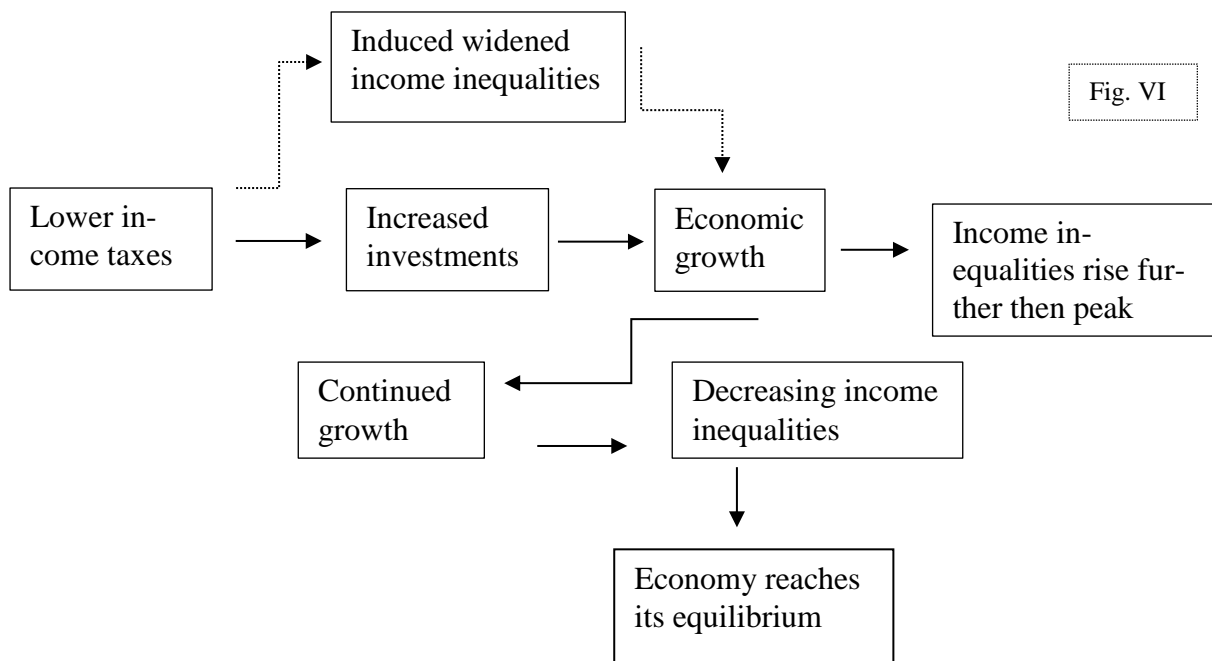


Fig. VI

By lowering marginal income tax rates (thus moving from left of—but close to—the government-revenue-maximizing position on the hypothetical Laffer curve to a lower growth maximizing point) income inequalities rise. This fuels economic growth mainly through increased investments but also through increased income inequalities. With persistently low tax rates the rich become even richer as they are the principal beneficiaries of a lowered marginal tax rate. The rich are enriched and more and more investments take place ($I = S$) due to excesses in money supply at the top income brackets. These investments make ‘the pie of GDP’ grow, both directly and indirectly over time as the investments yield returns over time. A larger modern economy (higher GDP) with a leaner welfare state is the result and the government shrinks in size. As more and more people reach the middle class income brackets (this may occur for a number of reasons, one conceivable way being cheap loans used for small businesses or investments in human capital, this is discussed briefly above under section 2.2) the general income inequalities begin to drop and the economy approaches and finally reaches its new equilibrium.

5.3.1 A speculative proposition to the Kuznets curve: a second cycle?

Now, assuming growth is kick-started by lowered marginal taxes, could it imply the Kuznets curve could be interpreted as cyclical rather than a one-time curve only accounting for the historical transition of an economy? The idea, building upon the discussion above, is that once a sufficient economic development has taken place and income inequalities are relatively equalized (the typical Kuznets curve would represent this economic transitional development) there is economically a possibility to shift capital to stimulate growth. So how would this second part of the economic cycle work more precisely? As has been shown above; when more capital becomes accessible through lowered taxes, investments are made in bigger numbers in the hands of private investors. Building on the assumptions previously made this starts the chain of events described above and increased economic growth is under way. This would explain the economic kick-start of the second cycle. Why, then, would income inequalities decrease over time during this second ‘Kuznets cycle’? Above some prominent academics give their diverse ap-

proach on what this catalyst for decreasing income inequalities may be. As is mentioned under section 2.2 it seems conceivable to join the two explanations of Aghion & Bolton (1997) and Perotti (1993). Aghion & Bolton stress cheap loans made readily available through the excess capital of the rich, while Perotti stress political power of classes leading to redistributive politics. Political pressure to decrease the income divides in addition to cheap loans used for capital accumulation is here assumed to account for the slope to the right of the second peak. In other words, I assume in this paper that political pressure in tandem with cheap loans used for capital accumulation will decrease the income inequalities over time.

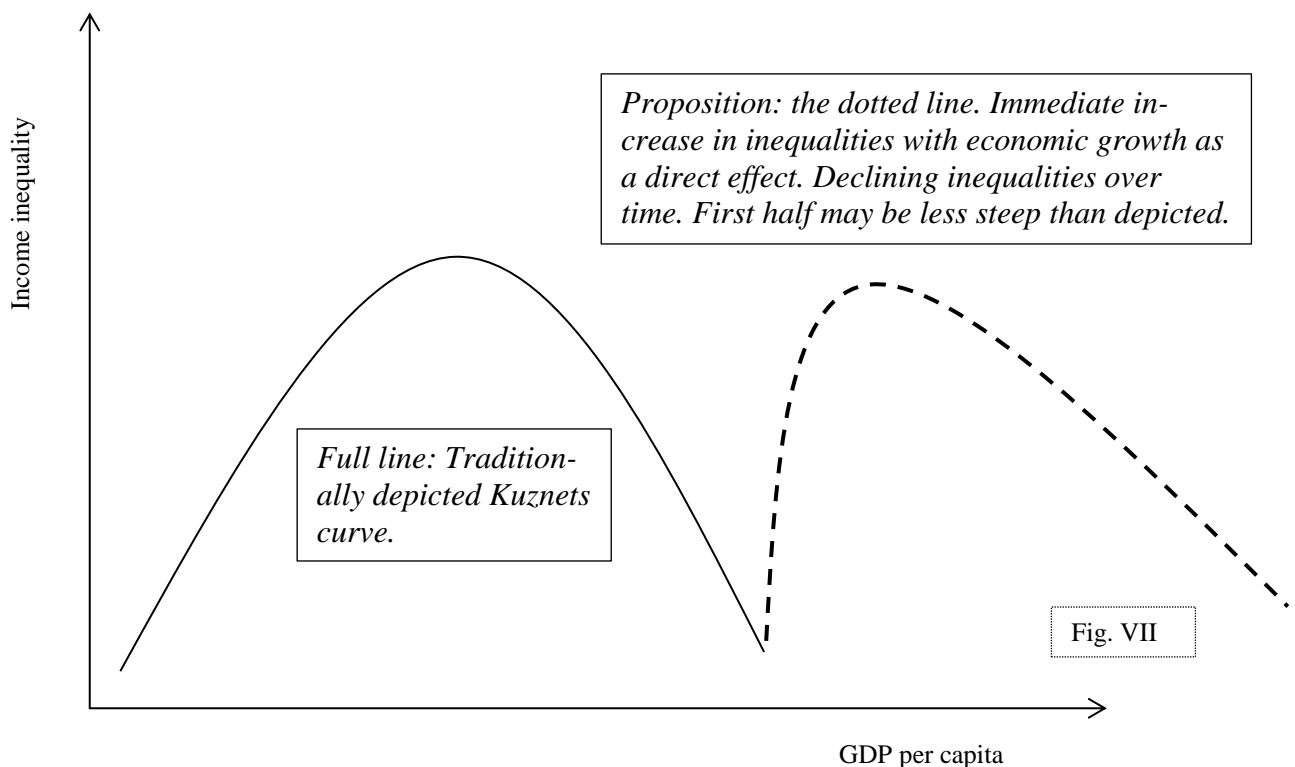


Fig. VII is yet another way in which to illustrate the hypothesis of this paper. Estimations of an actual curve have not been made and so the second curve above is purely speculative. The reason for depicting it is merely to communicate the way in which income tax cuts are assumed to work in this economy.

6 Conclusions

The working thesis of this paper (as presented in the beginning as well) has been: *Decreasing the marginal income tax rates in an economy with progressive taxes ignites economic growth directly through increased investments and indirectly through increased income inequalities.*

What conclusions may now be deduced? First, throughout this paper a number of assumptions have been made (and rather general ones as well) about what type of an economy is relevant to consider. The main assumption is assuming a modern western economy. One implication of this is that the economy is relatively well functioning (effective institutions, low corruption etcetera) as well as big. If a poor economy were to be considered the effects of increasing differences between the rich and poor could very well be the opposite.

Now, having made the array of assumptions I conclude a lowered income tax rate will *fuel* economic growth. There is, however, no long term effect on the economic *growth rate*, though there is a long term effect on the *level* of economic output. The economic growth rate is higher during the transition to the new and higher levels of input. In other words, as the economy converges towards a higher level of accumulated capital together with a higher labor supply, the economy grows. Once the new steady-state levels, or equilibrium levels, of the inputs have been reached the economic growth rates will be back to the same equilibrium growth rates.

The inputs are affected by the lowered income tax rate in the following way. The lowered income tax rate—now nearing the maximize growth point on the Laffer curve—free up capital which is used for investments (as $I = S$), thus increasing the savings rate. The reason the tax proceeds affect the savings rate is that I assume the individual has a higher propensity to invest than the government. The labor supply is increased as the price for leisure (and unemployment) goes up. This works in tandem with cuts in welfare programs. In other words, not having a job is now pricier.

7 Concluding comments

When discussing the increased inequalities it is sensible to consider the important distinction between relative and absolute income. What is proposed through the hypothesis in this paper is to increase the relative income differential by reducing the marginal income tax rate. However, this also makes those rich on capital become richer in absolute terms as well. From the other side of the social spectra the rest—those with less capital—are now relatively less well-off in comparison to the rich (who gain the most from reduced marginal taxes). However, while ‘the rest’ may be less well-off in relative terms they are not made less well-off in absolute terms. A reasonable assumption would, however, be that the poor will be worse off in relative and absolute terms in the short run.

The interest in (and importance of) examining this economic hypothesis lies in its implications and also the modern political embrace of the theory. Does the theory hold? What may the unaccounted for consequences be? What time-frame is valid to consider when changes in the economy are expected? Some economists mention that the very least a decade is needed for the economy to reach its equilibrium after a change in the tax policy (Engen & Skinner, 1996, p. 620). It is obviously problematic to assume any improvements in the economy from tax cuts to trickle-down through the economy within an electoral period. Just by adding the potential time horizon any positive changes will need prior to yielding any results we have the cost of those affected negatively by the policy to attend to.

If one does not elaborate on the proposed hypothesis by questioning it one might end up in a naive view where it is an almost magical theory: lower the taxes and expect higher revenues and a higher equilibrium. All are (eventually) made better off. Suppose the above is correct: in what time-frame can we expect growth as a direct result of the lowered tax rates and in what time-frame can we expect the new revenues from growth to cover the loss in tax revenues? When tax revenues are cut, what sectors will be directly affected by a cut in the budget? Some point to social welfare programs being the first to receive a smaller budget, and entire programs being cancelled as a direct result to cover the government’s re-

duced budget (Magazzino, 2012, p. 325 f.). On the other hand, the case may be made that the cut in taxes and following boost of the economy is in itself a welfare-scheme. The difference between the two would then be long term self-help rather than hand-outs today.

However, disregarding any time-frame it can be politically difficult to cut the government's budget. This is obvious when considering the size of different social groups. If those relying on welfare programs constitute a relatively large proportion of the constituency it would certainly be somewhat difficult to cut welfare and in the same breath claim this will immediately reduce poverty and unemployment. A more economic and less political point to add is that when taxes have been reduced in the past, the hole it leaves in the books while waiting for the expected growth and higher revenues have previously been filled in other ways than explicit taxes:

Second, taxes: despite the much touted tax cuts of 1981, taxes for the average person actually rose, and they rose every year thereafter. Of course, they weren't called "tax increases"; they were, instead, called "fees" or "plugging loopholes". Yet, the effect was the same. (The Economic Policy of Ronald Reagan: Between Supply-Side and Keynesianism, p. 326).

Also, it is important to differentiate between how politicians would describe the theory and how serious economists interpret the model: "For example, in the 2008 presidential election, Senator John McCain said, "Tax cuts, . . . , as we all know, increase revenues.""(S. Rosen & Gayer, int. ed. 2010, p. 423). This quote illustrates the importance of a clear differentiation between how a theory can be described in political and academic words.

7.1 Previous research

There have been many studies investigating the relationship between income inequalities and economic growth and this has been duly noted throughout the paper. What does this study bring to this thoroughly examined topic of tax rates and economic growth? This paper looks at how income tax rates may affect economic

growth in two ways; the more direct effect of affecting the savings rate and thus investments; the more indirect effect of affecting distributive politics by increasing the wage differential.

This paper concludes what other studies have concluded as well; lowering the income tax rate in a similar setting to the one I have will fuel economic growth (e.g. Engen & Skinner, 1996). However, regarding inequality and growth the similarities with other research are mixed. Voitchovsky, for example, looks at inequalities at different levels of the economy and concludes that inequality in the top income brackets is positively correlated with growth. Voitchovsky also concludes that inequality at the lower income brackets is negatively correlated with growth (2005). This division into different income brackets and their respective inequality is unfortunately unaccounted for in this paper.

So, the results presented in this paper do correlate relatively well with previous research with a similar setting (a western modern economy), such as Engen & Skinner. Some other studies, which also have a similar setting, do, however, *contradict* the results of this paper, such as Stokey & Rebelo (1995). In brevity they conclude that a tax reform would have very little (or even no) effect on U.S. growth rates. What research, then, is the most plausible one? To answer this question based on this paper is rather difficult as the results are heavily dependent on the choice of growth model (the Solow growth model). The presented conclusion would likely have been different had I chosen a different model such as any model of endogenous growth.

7.2 Propositions for a next step

The next step following this paper, seeing as this paper has proven somewhat fruitful in conceiving a theory, ought to be putting the theory of this paper to the test. This could be done in various ways and the curious reader will certainly produce more ideas for how to test this. I suggest that regression analysis of Western European countries for the last 30 years or so is run. The setting and time period are of course important as this theory is based on a western modern economy. What variables should be key variables then? Income tax rates, certainly, as well as a preferred measurement of income inequalities, perhaps the GINI-coefficient,

together with investment rates. Such an analysis would probably do well by controlling for leakages in the economy as these are assumed to be equal to zero in this paper. Also, the elasticity of labor must obviously be addressed in order to estimate the effects of the lowered income tax rate.

Now, the very final words of this paper I leave to the great Simon Kuznets with a quote seemingly written for this paper:

In concluding this paper, I am acutely conscious of the meagerness of reliable information presented. The paper is perhaps 5 per cent empirical information and 95 per cent speculation, some of it possibly tainted by wishful thinking. The excuse for building an elaborate structure on such a shaky foundation is a deep interest in the subject . . . speculation is an effective way of presenting a broad view of the field; and that so long as it is recognized as a collection of hunches calling for further investigation rather than a set of fully tested conclusions, little harm and much good may result. Simon Kuznets, 1955, p. 26

8 References

- Aghion, Philippe – Bolton, Patrick. *A Theory of Trickle-Down Growth and Development*. 1997. *The Review of Economic Studies*. Vol. 64, No. 2. (Apr., 1997), pp. 151-172.
- Acemoglu, Daron – Robinson, James. *The Political Economy of the Kuznets Curve*. *Review of Development Economics*. 6 (2), 183-203, 2002.
- Barro, J. Robert– Sala-i-Martin, Xavier. *Economic Growth*. 1995. Printed in USA by R. R. Donnelley & Sons Company. Published by McGraw-Hill Inc.
- Burda, Michael - Wyplosz, Charles. 2013. *Macroeconomics A European Text*. Sixth ed. Published by Oxford University Press.
- De Long, J. Bradford – Summers, Lawrence H.. *Equipment Investment and Economic Growth*. *The Quarterly Journal of Economics*, Vol. 106, No. 2 (May, 1991), pp. 445-502. Published by Oxford University Press.
- Engen, Erik – Skinner, Jonathan. *Taxation and Economic Growth*. *National Tax Journal*. 1996, Vol. 49, No. 4, pp. 617-642.
- Galor, Oded – Tsiddon, Daniel. *Income Distribution and Growth: The Kuznets Hypothesis Revisited*. *Economica, New Series*, Vol. 63, No. 250, (1996), pp. S103-S117.
- Galor, Oded – Zeira, Joseph. *Income Distribution and Macroeconomics*. *The Review of Economic Studies*. 1993. Vol. 60, No. 1, pp. 35-52.
- Hansson, Åsa. *Taxpayers' responsiveness to tax rate changes and implications for the cost of taxation in Sweden*. *Int Tax Public Finan* (2007) 14:563–582.
- Jones, I. Charles. *Introduction to Economic Growth* 2nd ed. 2002.
- Kuznets, Simon.. *Economic Growth and Income Inequalities*. *The American Publishing Review*. Vol. XLV, no. 1, March 1955. American Economic Association.
- Laffer, B. Arthur. 2004, June 1. The Heritage Foundation. *The Laffer Curve: Past, Present and Future*.

- Magazzino, Cosimo. *The Economic Policy of Ronald Reagan. Between Supply-Side and Keynesianism*. 2010.
- Moran, Patrick, Timothy. *Kuznets's Inverted U-Curve Hypothesis: The Rise, Demise, and Continued Relevance of a Socioeconomic Law*. *Sociological Forum*, Vol. 20, No. 2, June 2005.
- Pecorino, Paul. 1995. *Tax rates and tax revenues in a model of growth through human capital accumulation*. *Journal of Monetary Economics* 36 (1995) 527-539.
- Perotti, Roberto. *Political Equilibrium, Income Distribution, and Growth*. *The Review of Economic Studies*, Vol. 60, No. 4 (Oct., 1993), pp. 755-776.
- Robert M. Solow. *A Contribution to the Theory of Economic Growth*. *The Quarterly Journal of Economics*, Vol. 70, No. 1 (Feb., 1956), pp. 65-94. Oxford University Press.
- Stokey, L. Nancy – Rebelo, Sergio. *Growth Effects of Flat-Rate Taxes*. *Journal of Political Economy*. 1995, Vol. 103, No. 3.
- S. Rosen, Harvey – Gayer, Ted. *Public Finance*. 9th int. ed. 2010.
- Trabandt, Mathias – Uhlig, Harald. 2009. Revised 2011. *How Far Are We From The Slippery Slope? The Laffer Curve Revisited*. Nber Working Paper Series. Working Paper 15343 <http://www.nber.org/papers/w15343>.
- Voitchovsky, Sarah. *Does the Profile of Income Inequality Matter for Economic Growth?*. *Journal of Economic Growth*. No. 10, pp. 273–296. 2005.

Appendix

Fig. I: This is the traditionally depicted Kuznets curve, an illustration of a stylized fact of economic growth.

Fig. II: The curve is plotted for intuitive understanding of the theoretical relationship between tax revenues and tax rates. As it is plotted one might assume the peak corresponds to a 50 % tax rate. In experiments it has been estimated to be closer to 55 – 65 % (Burda & Wyplosz, 2013, p. 475). The dotted line represents another more realistic but less intuitive way to depict the relationship. The most common one is however the inverted U-shape (Burda & Wyplosz, 2013, p. 474).

Fig. III: Please do note that the $MPK = \delta$ condition, or golden rule amount of capital, is not depicted in fig. IV or fig. V. This is in fear of adding too much information rendering the graphs useless. Do note, also, that both curve $f(k)$ and $s \cdot f(k)$ show diminishing qualities and thus reach the derivative = 0. This may seem to not be the case in the illustration fig. III but certainly is the case.

Fig. IV: Depicted more carefully and accurately by Barro & Sala-i-Martin on page 25 (1995). $\frac{\dot{k}}{k}$ = the growth rate of the capital stock.

Fig. V: This flowchart aims at boiling down the most noteworthy steps of the Kuznets hypothesis.

Fig. VI: This flowchart aims at concluding the most important steps of the working hypothesis of this paper.

Fig. VII: The appearance of the second curve is intended to differ somewhat from the traditional Kuznets curve. This is in order to illustrate the dramatic rise in income inequalities induced by the tax reduction. The curvation is difficult to predict but a less steep first half of the second curve would indicate that inequalities keep on rising some unknown time after the taxes have been lowered. This is a conceivable alternative to the current illustration.