Summary of PhD thesis

# THE RELATIONSHIP BETWEEN GOVERNMENT REDISTRIBUTION AND ECONOMIC GROWTH

## An analysis of the inverted U-shaped curve

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## Contents

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# 1. Motivation

In the last 200 years there has been a remarkable economic growth in many countries around the world. Since the early 1800s - at the beginning of the industrial revolution - not only the income, but per capita income has been growing, that is, the income growth rate was higher than the population growth rate. Some countries grew faster, others slower, but this tendency was generally observed everywhere. Two main questions of growth theories are the following. Why does economic growth exist, and why do these countries differ in growth rates? Growth theories tried to identify the main factors of economic growth with more or less success. As time progressed, the significance of these factors has changed, and more and more new elements were included among the main sources of economic growth. According to the latest theories the cause of economic growth cannot be explained by only one factor. The doctoral thesis tries to show that one of these factors is government redistribution that also effects growth. Government redistribution means here the ratio of government expenditures and GDP. Size of government is a broader concept, which can include more indicators as well.

The intellectual source of the thesis – perhaps the biggest debate of the 20th century – was the question that what kind of role the government should play in a market economy. Then I was concentrating on the fiscal redistributive role of the state and focusing on how large share of the income the government should centralize, how much redistribution is needed or which is the optimal. This question is very general, so it is impossible to give an exact answer to it. The answer to the question depends on what is going to be optimized. The optimal size is different if we take economic growth, income, wealth, a certain level of development, well-being or something else. On the other hand it also matters that we take into consideration the government spending, the tax revenue, the ratio of government consumption or something else as a share of GDP as redistribution level or the size of the state, it also affects the outcome.

On the one hand there is a consensus about that – as it will turn out from the paper – to some extent of redistribution (interference) is necessary to ensure the economic activity that results economic growth. On the other hand, public intervention can be an obstacle to economic growth as well. If the size of the state intervention is measured only by the proportion of public expenditure and GDP, it raises the possibility that there is an inverted U-

shaped relationship between these measures of economic growth and redistribution: the level of spending can be too low and too high as well.

Two specific growth models also provide some theoretical basis on the U-shaped relationship between economic growth and redistribution. In the thesis, these two models give the theoretical framework for the study of the question, and they provide the central argument of Chapter 2 as well. Among others, Forte and Magazzino (2011) and Di Liddo et al. (2013) called this relationship BARS curve after Barro (1989), Armey (1995), Rahn and Fox (1996) and Scully (1994, 1995), so further this name will be used. Details about Barro and Scully models and the entire concept of BARS curve is introduced in Section 2.2. The definition of BARS curve is the inverted U-shaped relationship between the state redistribution (as independent variable) and economic growth (the dependent variable). The dependent and independent variables are only mathematical terms – as it turns out in chapters 2 and 3 – none of these variables are independent from the other.

Furthermore, how much is „needed" and how much of that is already „too much" depends on various conditions and other factors. Even the direction of the relationship depends on the analysed groups of countries, periods, institutional quality, and last but not least the government spending structure. Some of the authors found positive, the majority found it negative, while others found neutral, uncertain or no significant relationship at all between the two variables. A small slice of the literature assumes an inverted U-shaped relationship between them – which would theoretically be justified – but in some groups of countries it was empirically very difficult to detect it due to the heterogeneity of the countries.

According to the theories that take the fiscal role of the state into the focal point, developed (richer) countries have usually comparative advantage in government redistribution. There are also high and low redistributions in countries, and within these two groups we can find rich and poor countries as well. What is even more important, we can find high as well as low growth rates in each groups of countries. The picture is somewhat overshadowed by the fact that development is strongly influenced by the growth rate as well, and mostly negatively. But it seems likely that a number of cases occurs when a certain level of redistribution in one country is too much, but in another it would be too little.

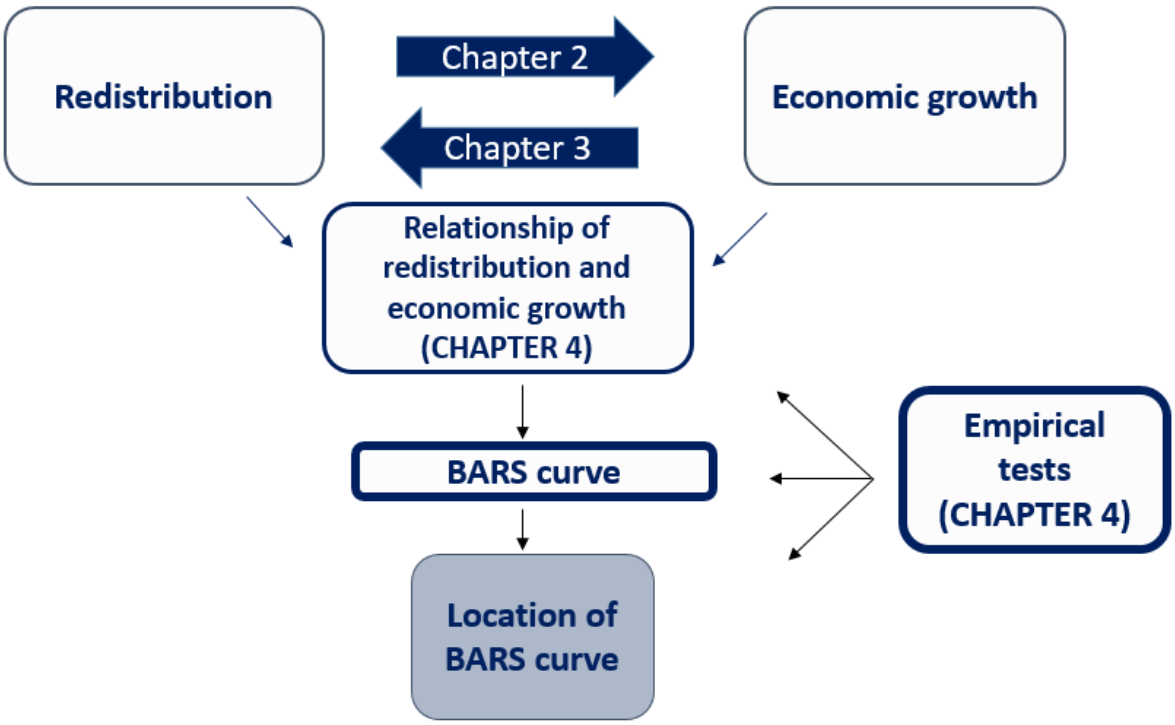
It follows from above that if the BARS curve exists, however, its location varies from country to country and from time-period to time-period. Depending on the location of its BARS curve it can occur that a country is on the descending side of the curve, however, another country for the same redistribution is even the upward sloping section. So BARS curve concept – besides all other factors are equal – can be accepted in theory, but there may

be several factors that shift this curve. So there is not only one BARS curve, which is generally applicable for all countries, and there is no general optimal level of redistribution as well, because these critical (growth maximizing) levels are different among the groups of countries.

Based on all these, the main research question of the thesis is the location of the BARS curve and the factors that determine it, and how it can be detected empirically.

The structure of the thesis is the following.

Figure 1: Logical structure of the thesis




Source: Own construction

# 2. Research question and hypotheses

The broader issue of the thesis is to analyse the relationship between redistribution and economic growth, but to do this, it is unavoidable to take into account the channels of mutual effects on each other.

The thesis starts from the contradiction that while some growth models provide the theoretical foundation of the inverted U-shaped curve, due to several factors it can be involved in doubt that this relationship really exists.

On the one hand, because the size of the state and level of government spending is not the same (Higgs 2012), and while it is true in the context of the state of its size, it is not necessarily true for public spending. On the other hand, even if there is an inverted U-shaped relationship for the government spending ratio, other country-specific factors can influence its parameters in the wider sense of development differences (Olson 1993, Djankov et al. 2003). Thirdly, not only the size of the state, but its "character" also matters: a relatively less active government interfere with the operation of a market economy, much like a fairly active one (Hayek 1960). In other words, a state can make worse job – creating the conditions for a market economy – as a large state.

Thus, the study takes the view that the existence of an inverted U-shaped relationship is questionable, and can only be expected to exist when the other dimensions of degree of state intervention (e.g. institutional quality) is regarded, because otherwise the increase in public spending does not necessarily mean an increase in the size of the state. The question is whether there is an inverted U-shaped relationship between redistribution (government spending) and GDP growth. According to Chapter 2-4, the following hypotheses were formulated:

The most known growth theories do not deal explicitly with the redistribution, for example as a factor of production, although it can be examined, within the framework of these models that how they influence the factors of growth. Two specific models (Barro 1991b, Scully 1998) were presented in Chapter 2, according to which there is theoretically an inverted U-shaped relationship between the two variables that was later named after researchers[1] who discovered BARS curve, and some of them tested it as well. Due to the heterogeneity of the countries, this curve is very hard to detect generally, so Mueller (2003) – that I introduce in Chapter 4.5 – distinguished different (more homogeneous) groups

[1] *Barro* (1989), *Armey* (1995), *Rahn* and *Fox* (1996) and *Scully* (1994, 1995).

according to the level of income. It is Mueller's hypothesis that according to this systematization, richer groups has theoretically a larger threshold value than less developed groups.

If we just look at the effect of the redistribution on growth, the BARS curve should exist, and this theoretical assumption is based on the theoretical models mentioned above. According to Mueller's hypothesis based on the income levels, different positions of the BARS curve can be distinguished. As higher institutional quality contributes to an increase in the efficiency of government spending, I assume it is a better group-forming factor. Based on this theory, countries with a better quality of institutional system should have a larger threshold level of redistribution, which leads to maximal economic growth, all other factors being equal. This assumption is overshadowed by the tendency that income and institutional quality are closely and positively related to each other, and better quality affects growth partly through higher investment rates.

Summing up the main findings of the relevant literature – especially Barro and Scully model, as well as Mueller's hypothesis – putting together with Bergh and Karlsson (2010) results based on the effects of institutions the first hypothesis can be formulated as follows.

**Hypothesis 1:** *The theoretical models that underlie the BARS curve consider the level of public spending as a measure of the size of the state, and they assume that the quality of institutions is independent of its size. As a consequence they find an inverted U-shaped relationship between growth and government spending.*

As the above-mentioned specific growth models and the empirical literature does not take into account that not only the redistribution affects economic growth, but income influences redistribution as well, so I must deal with this effect, at least theoretically. This opposite effect is supposed to lead to the redistribution expanded beyond the critical level in many countries, which is effective in terms of economic growth.

If a particular group of countries' BARS curve exists with and without this opposite effect taken into account, then in both cases we would get the same threshold level, but where there is a strong opposite effect, the current value easily exceeds that critical (growth maximizing) value.

**Hypothesis 2***: If we consider those public choice approach-based models that explain the size of the state, then the interpretation of the inverted U-shaped relationship for economic growth and public spending-to-GDP ratio will change, because it reflects the causality running from economic growth towards redistribution. The maximum of inverted U is therefore not suitable as a tool for economic policy to maximize (medium-term) growth rate in order to reach its objectives.*

Presumably, countries that have more developed institutional system, their BARS curve is situated to the right comparing to less developed countries. So the critical (growth maximizing) value is greater in the former group than in the latter. I assume that more measures of institutional quality is appropriate to show it.

If we consider a linear relationship, for poorer countries (with mostly smaller governments) it is rather positive, while for the richer ones (with mostly larger governments) there is a negative relationship between redistribution and growth.

Inverted U-shaped curve – assumed by some growth theories – can be detected if a greater proportion of public spending actually means more state intervention, and state interference occurs under similar institutional conditions. In other words, the so-called BARS curve can only be detected in econometric studies when the size of the state and other dimensions of quality of market institutions are considered stable.

However, if BARS curves are detected for the groups, the state has a "comparative advantage" in government spending supposedly in developed countries (Olson, 1993), which is connected to the third hypothesis.

**Hypothesis 3:** *The BARS curve of the group of countries with more developed institutions is located to the right of the BARS curve of the group of countries with less developed institutions. This means that the critical (growth maximizing) value is higher for those with more developed institutions than for those with less developed ones.*

However, institutional development and economic development are closely related to each other, since institutions are fundamental determinants of economic development (Acemoglu et al. 2014). On the other hand, as it turns out from chapter 3 of the paper, economic development creates a demand for state intervention, resulting that the actual level can be higher or lower growth-maximizing level according to BARS-curve hypothesis. Developed countries are, therefore, more likely to be on the downward sloping side, while less developed

are more likely to be on the upward sloping side of the curve. This makes the fourth hypothesis.

**Hypothesis 4**: *As far as the relationship between redistribution and growth is concerned through a linear model, the slope of the curve describing this relationship is probably positive in poorer countries, while, it is more probably negative in wealthier countries with the country-specific – mainly institutional – factors being constant.*

# 3. New results of the thesis

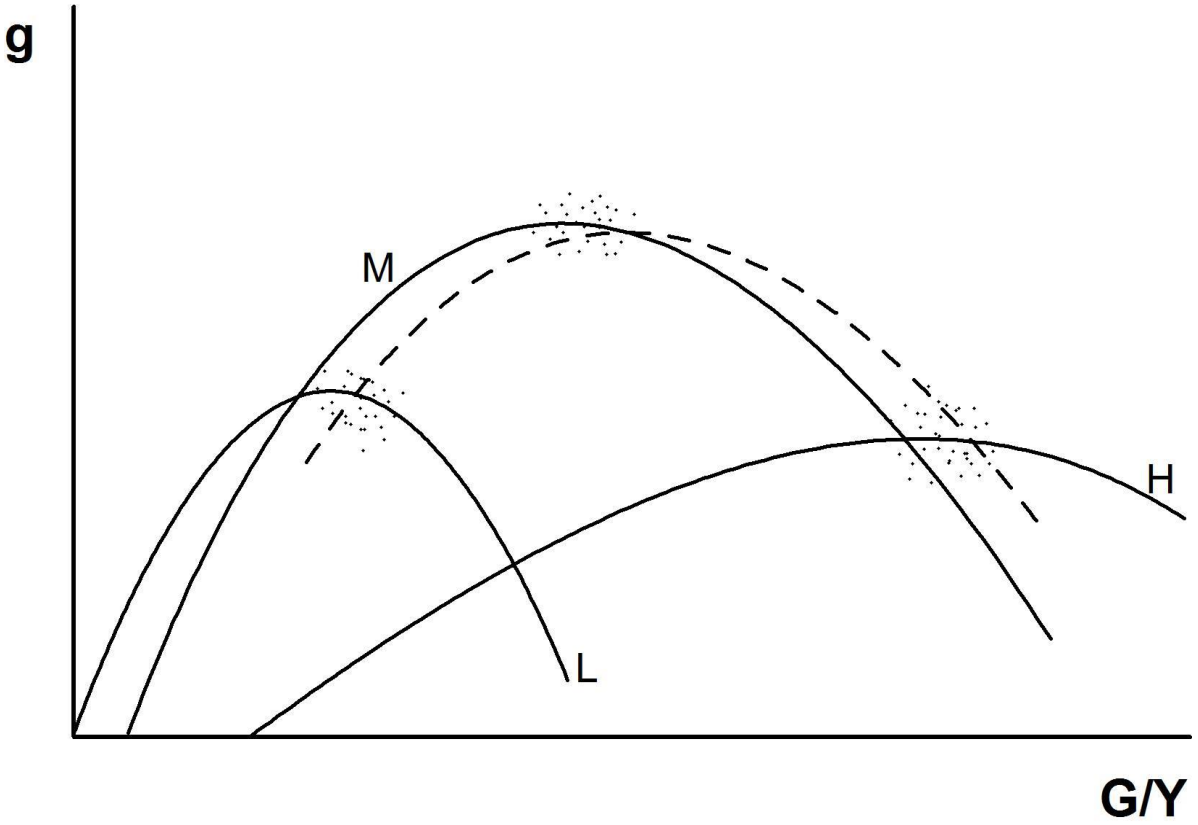
As I mentioned above, growth theories do not deal explicitly with redistribution, for example as a factor of production, although it can be examined, within the framework of these models that how they influence the factors of growth. The AK model enhances the factor accumulation as a key factor of growth, which government can accelerate through the saving rate. Harrod-Domar model highlights the interventional role of the state. In the Solow-model the saving rate is exogenous. Some models underline the significance of human capital, and some others the role of institutions.

In section 2.2 I present two special models that deal with government redistribution as a factor of production. These are specific models that involve government spending, and use similar instruments as the basic models, with some additional restrictions. Both of those models conclude that the relationship is U-shaped. This is the theoretical initial point of the dissertation.

In the dissertation, these two specific models were used, the Barro and Scully model. The third model in 4.5 – which is actually a hypothesis within the scope of a public choice theory models – accepts that the BARS curve exists, and assumes that it is not located at the same place for different income groups. So Barro (1991b) and Scully (1998) model derive a kind of BARS curve, however, empirical cross-country tests do not really support this because of great heterogeneity.

Mueller's (2003) hypothesis also deals with the location of the BARS Curve, which makes it possible to demonstrate the supposed relationship in sufficiently homogenous groups in terms of income.

1. graph: Location of BARS curve for different income groups




Source: *Mueller* (2003:550).

Mueller (2003) model, however, deals with the location of the curve, so it gives the opportunity to distinguish different levels if appropriately homogenous groups are separated. Mueller considers income as a good group-forming factor. My remark is that the quality of institutions seems to be a better factor, which may increase the efficiency of government spending.

**Thesis 1:** *If we just focus on the effect of the redistribution on growth, the BARS curve (i. e. inverted U-shaped curve) is a theoretical conclusion is derived from different models. Other models imply different BARS curves for country groups with different levels of income. With higher quality institutions increasing the efficiency of government spending, it seems theoretically better to assume that institutional quality is a better group-forming factor than income. Accordingly, countries with better institutions have a larger threshold (growth maximizing) level of redistribution, all other factors being equal.*

In the last 150 years we have experienced a great increase in government expenditures, because economic growth has created a larger demand on government intervention and redistribution, as exactly the Wagner law claims.

In addition, the growth of redistribution has mainly public choice reasons. Among other reasons, such as median voter theory usually wants more redistribution, because he or she is poorer than the average voter. This is not only due to income, but income inequality. In democracies governments often use public debt as a strategic variable, and their optimal decision is to increase redistribution level, though this process does not serve economic growth at all. Most of the empirical literature examines the impact of the increase in government spending on growth, but – as it can be seen in the theoretical explanation of the Wagner's law – economic growth also affects the growth of redistribution.

The second thesis also starts from the findings of the literature, thinks it further on the basis of independent observations, highlighting the relationship between various statements due to a conclusion.

**Thesis 2:** *Theoretical models – supporting the inverted U-shaped relationship between redistribution and growth (Barro, Scully) – do not deal with the influence of income on redistribution. If this reverse causality is taken into account, the conclusion regarding the critical value of redistribution does not change, but it helps us understand why the higher-income countries have grown beyond the threshold (growth maximizing) value. Mueller's hypothesis – that the group of richer countries' position is different – can still be empirically true, however, because richer countries usually have higher institutional quality, and the location of the curve is directly influenced by institutional quality.*

After theoretical review some empirical analyses were performed. A sample of the majority of world's countries were broken up into five sub-samples, and for the first time using panel regression, linear specification and Mankiw–Romer–Weil (1992) framework, concluded that the sign of the relationship in the low-income countries was unexpectedly uncertain, while in high-income countries the relationship was negative – as expected – between redistribution and economic growth.

Despite the diverse and divergent results of the empirical literature it can be concluded that in poorer, less developed countries positive relationship is possible, the richer, more developed countries, however, seems decisive for the negative relationship.

This in itself can project the inverted U-shaped relationship, so a large heterogeneous sample was also tested the relationship between where also using panel regression and a linear model, but using the square of the redistribution as well, and the inverted U-shape was verified.

The results of the linear specification can be summed up in three points. On the one hand, when economic growth as a dependent variable was tested, all of the EU Member States gave a negative coefficient of state redistribution. It can be concluded that EU Member States – comparing to all countries – belong mainly to the richer countries of the world (assuming that BARS curve exists) – as they are typically higher redistributors – they are on the downward sloping section of the BARS curve.

On the other hand, considering the whole world, there is a negative relationship between economic growth and redistribution in high-income countries, but in low-income categories mainly positive but uncertain relationship can be found. This finding foreshadows the inverted U-shaped relationship existence, which was also tested.

Thirdly, in terms of the world as a whole, I assumed an inverted U-shaped relationship between growth and redistribution, and I had no reason to reject it, approaching redistribution by government consumption. However, when I tested Mueller's hypothesis for different income groups, in none of them was found a stable inverse U-shaped relationship in any indication.

There is a positive relationship between real income and redistribution, in the European Union and in the world as a whole as well. In other words, in richer countries a higher proportion of their income is redistributed. This finding is supporting the Wagner Act.

**Thesis 3:** *With a linear specification, in poorer countries the relationship between redistribution and growth is positive or uncertain, while in wealthier countries it is significantly negative. With a quadratic specification it is shown that for a sample including almost all the countries in the world (176 countries) the BARS curve exists.*

A more thorough analysis on the effects of the two directions will contribute to a better foundation on "real" relationship between redistribution and growth. Then it was shown – under certain conditions based on mathematical derivation in Chapter 5 – if the threshold value also exists with and without considering the return effect, then the two levels must coincide.

Thus, taking into account the opposite effect, it will not change the threshold, but also highlights that where these effects are strong, there redistribution level exceeds that threshold.

From the results of Chapter 5.5, it appears that the critical value is higher in developed countries than in developing countries. The theoretical explanation lies in the fact that due to higher quality of institutions improves the efficiency of redistribution.

So if we accept the BARS curve existence, and if we move along the curve, if any endogenous variable (redistribution or growth rate) change. However, the curve shift may result in changes in all the factors that affect both the relationship between variables. Mueller model of development based on these factors that can be measured by the income. Such factors are assumed (among other things) as abandonment of economic freedom index for the government's size reported one index, the rule of law, the level of corruption (the decline shifts the curve to the right) and a new approach of economical, legal and political institutional quality (Kunčič 2014). Based on the assumptions of the group of countries that have better institutional quality, their BARS curve is situated to the right, that is, the threshold is higher, above which had a negative relationship, which were partially demonstrated with econometric methods.

**Thesis 4:** *For the sample of countries with more developed institutions the BARS curve is located to the right of the BARS curve of the sample of countries with less developed institutions. The critical (growth maximizing) value is therefore higher for those with more developed institutions than for those with less developed ones.*

# 4. Further research directions

In the dissertation I tested only the general redistribution with sophisticated techniques, but the elements of fiscal policy such as government spending, consumption or investment were not included in regressions. The expenditure structure of the simple descriptive statistics conclusions I drew conclusions minor. In the following the structure of government expenditure at different levels can be considered, which is much more - up to specific economic policy recommendations to constituents - the results can be formulated. It has exceeded the limits of the dissertation, but the method used in the thesis may also have to disaggregate indicators, the various structural units of government spending examine the growth effects separately. Because of redistribution - as an aggregate indicator containing many elements - a combination of various structural elements can occur, so these effects separately, it would be worthwhile to consider.

Another interesting research area might be for each country can be estimated curve parameters of the inverted U-shaped separately on time-series basis, with this technique - certain assumptions, - it is possible to determine the location of economic growth is critical for redistribution levels and this can be compared to different countries and different periods, and the latter trends for the critical value can be inferred.

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## List of publications related to the dissertation

Article(s), studies (4)

1. **Nádasi L.**: Az újraelosztás és a növekedés kapcsolata: Egy empirikus vizsgálat eredményei. *Köz-Gazdaság. "Közlésre elfogadva"*, 18, 2016. ISSN: 1788-0696.

2. **Nádasi, L.**: How does Economic Freedom Influence the Relationship between Government Size and Convergence? *Anale. Univ. Oradea : Stii. Econ. 24* (1), 623-630, 2015. ISSN: 1222-569X.

3. **Nádasi L.**: Az állami újraelosztás és a gazdasági növekedés hosszú távú összefüggései. *Competitio. 13* (1), 132-146, 2014. ISSN: 1588-9645.

4. **Nádasi L.**: A growth accounting fejlődése a növekedéselméletek tükrében. *Competitio. 10* (1), 85-103, 2011. ISSN: 1588-9645.

## List of other publications

Article(s), studies (3)

5. **Nádasi L.**: Válság, következmények és feladatok : Földobott kő? - Tények és tendenciák a 21. században : Gazdaságpolitikai kerekasztal, Debreceni Egyetem Közgazdaság- és Gazdaságtudományi Kar, Debrecen, 2011. április 15.. *Közgazdasági Szle. 58* (6), 565-569, 2011. ISSN: 0023-4346.

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6. **Nádasi L.**: A fiskális politika sokrétűsége.
*Competitio. 10* (1), 158-162, 2011. ISSN: 1588-9645.
( Ismertetett mű : Benczes István ; Kutasi Gábor : Költségvetési pénzügyek. Budapest : Akadémia Kiadó, 2010, 358 p. ISBN: 9789630589185 )

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( Ismertetett mű : szerk. Muraközy László : Válságban és válság nélkül : a gazdaságpolitika rétegei. Budapest : Akadémiai K., 2010, 263 p. ISBN: 9789630588393 )

Conference presentation(s) (3)

8. **Nádasi L.**: A termelési tényezők hozadékának empirikus elemzése.
In: "Hitel, Világ, Stádium" Nemzetközi Tudományos Konferencia" Nyugat-Magyarországi Egyetem Közgazdaságtudományi Kar. 2010. november 3. Közread.: Nyugat-magyarországi Egyetem Közgazdaságtudományi Kar NymE KTK, NymE KTK, Sopron, 1-8, 2010. ISBN: 9789639883734

9. **Nádasi L.**: Termelési függvényekről.
In: Tavaszi Szél, 2009 : konferenciakiadvány : [2009. május 21-24., Szeged ...]. Közread.: közread. a Doktoranduszok Országos Szövetsége, DOSZ, Budapest, 305-313, 2009. ISBN: 9789638756930

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The Candidate's publication data submitted to the iDEa Tudóstér have been validated by DEENK on the basis of Web of Science, Scopus and Journal Citation Report (Impact Factor) databases.

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