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THE ECONOMIC GROWTH EFFECTS OF WAR AND CIVIL WAR IN IRAQ

Abstract

The purpose of this paper is to study the effects of war and civil war in Iraq on the country's economic growth in a theoretical way. A simplified form of the neo-classical growth model by Solow (1956) is used and the channels are worked out, through which war and civil war could affect the single parameters of the applied growth model. It appears that, from a theoretical point of view, the destruction of the capital stock by bombings is likely to gain higher growth rates by enfolding the economy's forces of recovery. But it also appears that these forces are reduced by disruption, diversion, dissaving and portfolio substitution effects and lower Iraq's opportunities for a full recovery.

Key words:

Economic Growth, Civil War, Iraq.

JEL: O41, O53, N45.

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1. Introduction

Iraq is a country that has suffered from dictatorship, war and sanctions for decades. 1980, one year after Saddam Hussein had become president and leader of the Baath party, the Iraq-Iran-war began. This war took eight years. In the late 80's, hundred-thousands of Kurds were killed by the «Operation Anfal», a genocidal action of the Iraqi government against Kurds. In 1990 Iraqi troops occupied Kuwait. The UN Security Council imposed an embargo over Iraq that prohibited nearly all trade. Because the international appeal to the Iraqi government to leave Kuwait was ignored, the Gulf War started in January 1991. This war took only 6 weeks, but devastated Iraq's economy sensitively by its systematically bombing of infrastructural facilities. After the Gulf War, embargoes were kept and linked to the removal of weapons of mass destruction. In 1996, sanctions were relaxed by the «oil-for-food-program», which permitted Iraq to sell oil in exchange for food and medicine on the world markets. The terrorist attacks of September 11th 2001 changed the US foreign policy. The claim was put to remove the Baath regime in Iraq. These changes finally led to the Iraq war in spring 2003. Saddam Hussein and his regime were removed, but the attempt failed to guarantee a peaceful life for the Iraqi people. Instead, immediately after the occupation a harmful civil war enfolded between political, religious and ethnic motivated groups. These circumstances slow down Iraq's potentials for recovery.

This paper aims to show how the consequences of Iraq's sad contemporary history and how especially the persistent civil war in Iraq could affect the country's growth opportunities. For this purpose, a simple neo-classical growth model is applied. Section 2 introduces some facts about the economic development and performance of the country, section 3 develops a basic model of economic growth, section 4 brings the effects of war and civil war into this basic model and section 5 concludes.

2. Economic Facts about Iraq

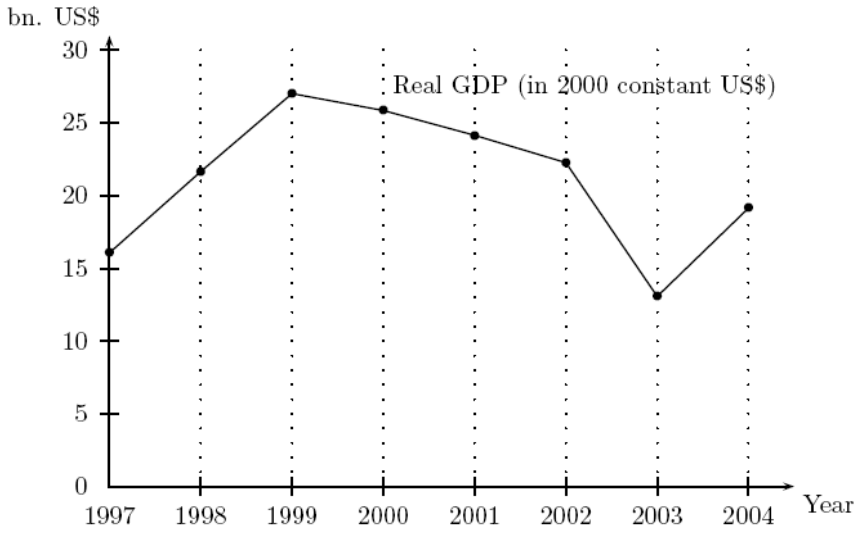
After decades of war and dictatorship, it is almost impossible to get reliable economic data on Iraq. During the Hussein-era economic statistics where treated like a state secret. But there are some estimations of economic key data.

According to such estimations, Iraq's GDP could increase before the outbreak of the Iraq-Iran-War (the first gulf war) in 1980, although the economy was more and more centralized by the government after the socialist oriented Baath-Party had come into power [1; 7]. This increase of GDP was due to a climbing oil price. The first gulf war led to a heavy slump of the oil production on the one

hand and a strong militarization of the economy on the other hand. The consequence was a debt crisis featured by hyperinflation. Thus, Iraq's price adjusted GDP was halved over the 80's. 1990 the second gulf war began with Iraq's invasion in Kuwait. The consequence was an UN trade embargo that led to further heavy decreases of real Iraq's GDP. Also the humanitarian situation became worse in this time. 1995 the so called «oil-for-food-program» was installed by the UN Security Council which led to an improvement of medical care and supply of food [14]. In this time, also the overall economy of Iraq began to recover moderately. This more recent development is shown in figure 1. Real GDP achieved a peak in 1999 and began to fall with the year 2000. Caused by the Iraq war, GDP dropped down by estimated round 40% from US$22 bn. to 13 bn. in 2003. Following the World Bank estimates, the economy was able to recover its GDP up to US$19 bn. in 2004.

Figure 1.

Gross Domestic Product of Iraq from 1997–2004 (estimated)



Source: WRI Earth Trends (2007), World Development Indicators (2007).

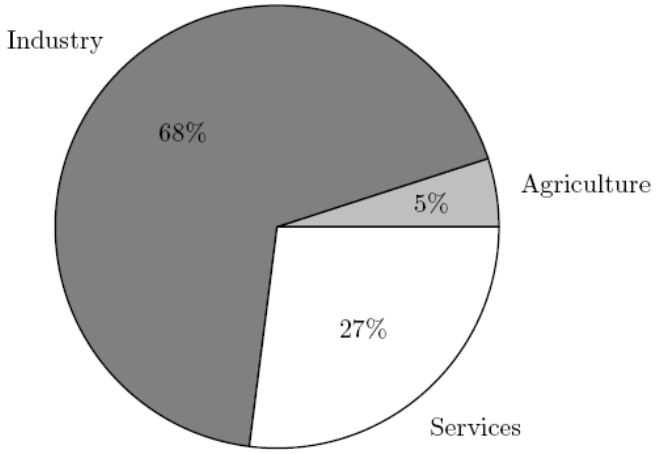
An estimation of the composition of Iraq's GDP in 2007 is illustrated in Figure 2. The industry sector has got the biggest share with 67%. The reason is that the oil production is added to the industry. There is not much industrial production in Iraq. The value added by the industry sector is almost solely deter-

mined by the oil production [14; 11]. Other industry sector products are chemicals, textiles, leather, construction materials, food processing, fertilizer and metal fabrication/processing. Services contribute with 27% to Iraq's GDP, agriculture only with 5%. Main agricultural products are wheat, barley, rice, vegetables, dates, cotton, cattle, sheep and poultry.

Analogously to this composition of the GDP, the Iraq's exports are dominated by oil. Nearly the complete oil production of Iraq is exported whilst imports are dominated by food and pharmaceuticals as well as engines. The CIA World Factbook (2008) estimates that exports amounted US$34 bn. in the year 2007, over 60 % of Iraq's current GDP, during imports amounted at US$23 bn. Exports were sent mainly to the USA (47%), Italy (11%), Canada (6%) and Spain (6%). Imports came mostly from Syria (27%), Turkey (20%), USA (12%) and Jordan (7%). Iraq's external debt level is estimated to US$56 bn. which equals the estimate for the current GDP of 2007.

Figure 2.

Compostion of the Iraq's GDP in 2007 (estimated)



Source: CIA World Factbook (2008).

3. A simple Neo-Classical Growth Model

To explain the impact of war and civil war in Iraq on the country's economic performance, a simplified version of the neo-classical model of economic growth by Solow (1956) is applied [2]. Assume a economy produces its GDP using capital and labor. The production function of the GDP (Y) can be written as a function of capital (K), labor (L) and labor productivity (h):

$$Y = Y(K, hL).$$

For simplification, this function is used in a reduced form as a Cobb-Douglas-Production-Function:

$$Y = AK^{\alpha}(hL)^{1-\alpha}, \tag{1}$$

A is the total factor productivity. It is a measure for technological, but also for institutional development as legal security, for example. A technological and institutional well developed economy therefore has got a better framework for a high GDP. $0 < \alpha < 1$ is the elasticity of production of the capital input. If the use of capital is decreased by 1% in the economy, the output decreases by α %, ceteris paribus. Analogously, $1-\alpha$ is the production elasticity of the input labor.

To transform this static consideration into a dynamic model, production function (1) is dynamized to continuous growth rates:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \alpha\frac{\dot{K}}{K} + (1-\alpha)\left(\frac{\dot{h}}{h} + \frac{\dot{L}}{L}\right) \text{ or} \tag{2}$$

$$\hat{Y} = \hat{A} + \alpha\hat{K} + (1-\alpha)(\hat{h} + \hat{L}), \tag{3}$$

where a dot ($\dot{}$) marks the marginal variation of a variable over a marginal time unit[1]. Thus, $\dot{Y}$ can be seen as the change of the GDP per second. If this change per second is related to the initial value of the GDP, one yields the continuous growth rate. A hat (^) marks growth rates in percent. Thus, $\hat{Y}$ is the economic growth rate of the economy.

From equation (3), which shows the component of the economy's economic growth, it can be seen that the growth rate of GDP is determined by the growth rate of the population $\hat{L}$, of the productivities $\hat{A}$ and $\hat{h}$ as well as the one of the capital stock $\hat{K}$. Population growth rate $\hat{L}$ is assumed to be given exogenously by the birth-rate, mortality and migration. Total factor and labor productivity growth rates $\hat{A}$ and $\hat{h}$ are also assumed to be exogenously given.

[1]The transformation of equation (1) into continuous growth rates is achieved by logarithmizing it.

The growth rate of the capital stock $\hat{K}$ earns a closer examination. In a (marginal) time unit, the capital stock grows by direct investment *I*. In the same (marginal) time unit, the capital stock looses a fraction δ by depreciation. Therefore, the change of the capital stock over time can be denoted as:

$$\dot{K} = I - \delta K. \tag{4}$$

In a macroeconomic equilibrium, investment must equal the savings of the economy. Savings are the part of the households' income that they don't use for consumption. It is lent to a bank that passes the money on to the investing firms as a credit. Further, the income of all households equals GDP, because the profits of the economies firms are paid to the workers and the capital owners as the assumption of competitive markets yields zero profits. So, investment can be written as the savings rate *s* multiplied by GDP: $I = sY$. Considering this in (4) gives[2]:

$$\dot{K} = sY - \delta K. \tag{5}$$

Substituting Y by the GDP equation (1) in (5) and dividing it by the initial capital stock K gives the growth rate of the economy's capital stock:

$$\hat{K} = s \cdot A \cdot \left(\frac{h \cdot L}{K} \right)^{1-\alpha} - \delta. \tag{6}$$

Equation (6) shows a central context of this analysis: growth of the economy's captial stock depends on the initial capital stock, labor endowment, productivity, savings rate and depreciation rate. While the initial capital stock and the depreciation rate have got a negative impact on its growth rate, the other sizes are positive related to the capital growth rate (see table 2).

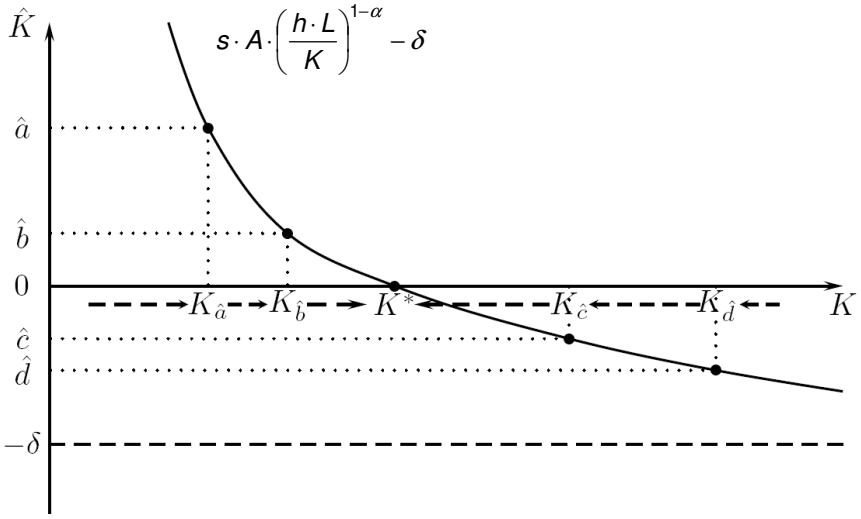
In figure 3, equation (6) is used to show the relation between the initial capital stock and the according growth rate of the capital stock. It can be seen that there is just one stable equilibrium level of capital stock. If there is a low endowment of capital $K_{\hat{a}}$ in the economy, it goes along with a high capital growth rate $\hat{\alpha}$. A positive capital growth rate causes that the initial capital stock of the next period is higher, for example $K_{\hat{b}}$. This higher initial capital stock is related to a lower capital growth rate $\hat{b}$. That works so long as the growth rate is positive. If it is negative, the capital stock shrinks, because depreciations prevail over investment. The once possible stable equilibrium appears to be a capital stock of K^* with a stable capital growth rate from 0. Setting $\hat{K} = 0$ in equation (6) gives the formula for the steady state capital stock K^*:

$$K^* = h \cdot L \cdot \left(\frac{s \cdot A}{\delta} \right)^{\frac{1}{1-\alpha}}. \tag{7}$$

[2]Note that *s* and δ is assumed to be exogenously given and independent from time.

Figure 3.

Relationship between initial capital stock and its growth rate



Going back to the growth function of the economy's GDP (3), it can be seen that the economy's GDP growth rate is positive related to the growth rate of the capital stock, determined by equation (6). If the capital stock grows by 1%, GDP grows by α %, ceteris paribus. Further, the growth rate of the GDP is determined by the growth rates of total factor productivity, labor productivity and labor force. The next section investigates how the situation in Iraq influences the framework of this model.

4. Consequences of War and Civil War

The current situation of civil war in Iraq is initiated by the US-led invasion in 2003. This international war took only a couple of weeks and the gravest effect on Iraq's economy is apt to be a partial destruction of the economy's capital stock. Since that time Iraq suffers from a civil war. Civil wars have specific characteristics which more or less vary from international wars such as the Iraq's invasion. Collier (1999) mentions five characteristic effects of a civil war. The first effect is that a civil war damages the economy through *destruction* of resources. Labor force is killed or injured and infrastructure is destroyed. Destruction of infrastructure and therefore the capital stock is likely to be less than in an international war, because civil wars are usually fought with much lower technology.

The second effect is that warfare leads to *disruption* which goes hand in hand with social disorder. Organizations of the state, such as the police, and institutions, such as civil liberties, are undermined by a civil war. This is likely to diminish the public expenditure efficiency. For example, Isham et al. (1995) found that lower civil liberties lower returns on World Bank financed projects. An international war could also bear such disruption effects, but it also could strengthen the state (Herbst 1990). The break down of social order and the absence of a clear front line are much more distinctive for a civil war. A third economic effect of civil war is the *diversion* of public expenditure. The state concentrates its expenditure more on internal security instead of stimulating economic growth or recovering social systems (del Castillo 2001, for example). There is empirical evidence that this diversion has a negative impact on one country's economic growth (Knight et al. 1996). A fourth effect caused by civil wars is *dissaving* which goes hand in hand with higher risks (del Castillo 2001). And fifthly, as a consequence of a damaged economic environment, civil war leads to *portfolio substitution*, meaning assets are shifted out of the country.

The question is now, which effects could arise in the growth model introduced in section 3. The exogenous sizes of the growth model are capital stock K, labor force L, total factor productivity A and labor productivity h, depreciation rate δ as well as the savings rate s. These sizes explain the growth of the capital stock $\hat{K}$ and via this channel the overall economic growth rate $\hat{Y}$, which is additionally determined by the growth rates of labor force and productivities: $\hat{L}$, $\hat{h}$ and $\hat{A}$..

The effects of the invasion could be characterized like a sudden negative shock, especially on the country's capital stock K and its labor force L. In the presented model, the impacts of a sole reduction of the capital stock are obvious. When the capital stock is removed from, say, $K_{\hat{b}}$ to $K_{\hat{a}}$ in figure 3, the economy is able to recover with preliminary higher growth rates of the capital stock, which also will preliminary accelerate the growth rate of the economy's GDP. This higher growth will hold on until the capital stock is recovered to the prewar level. Then the economy will move along the same growth path as before the war. Thus, if the invasion just removed the capital stock, ceteris paribus, the economy's development is repulsed for a certain time. But at all, it is able to achieve the same growth path after its recovery. An additional sudden reduction of the economy's labor force L by killing or maiming humans influences the pace of the recovery of the capital stock negatively. From equation (6) follows that the bending of the capital transition curve in figure 3 will be higher and the steady state capital stock K^* will be lower.

These first effects of the invasion war are aggravated by the civil war effects. Negative shocks on capital stock and labor force remain in a civil war but should be smaller than in an international war. This is the destruction effect. Collier (1999) argues that both the disruption and the diversion effect of the civil war have a negative impact on productivity. Disruption causes uncertainty and there-

fore leads to a misallocation of resources. When roads become unsafe, costs arise to secure them. When in addition budgetary activities by the state become diverse from output-enhancing activities, productivity declines. In terms of the variables in the model, *A* and *h* will be reduced. Collier (1999) further argues that both the disruption and the diversion effect increase the depreciation rate of capital, δ. Risks arising from a civil war may also reduce gross investment (Murdoch and Sandler 2002) and abreast the economy's savings rate *s*. At all, these effects of a civil war lead to a shift of the curve in figure 3 the bending of the curve will be higher (lower *L*, *A*, *h* and *s*) and the curve will be relocated downwards (higher δ). Thus, steady state capital stock K^* will be lowered even more.

One further issue is that resources leave the country [5; 12]. In terms of Collier [5], the export of capital is the fifth effect, portfolio substitution. He argues that domestic capital can gradually be transformed into financial capital by reducing gross investment relatively to depreciation rate δ. This lowers steady state capital stock K^*, again. But also emigration is a problem [3]. Emigration tends to lower the growth rate of the labor force, $\hat{L}$. Through this effect, it doesn't have any effect on the capital stock's growth potential, but it lowers the GDP growth rate at all, as can be seen in equation (3)[3].

Bringing all these arguments together, the circumstances in Iraq are likely to affect the exogenous variables of the presented growth model in the following way shown in table 1.

Table 1.

Impacts of war and civil war on the exogenous variables

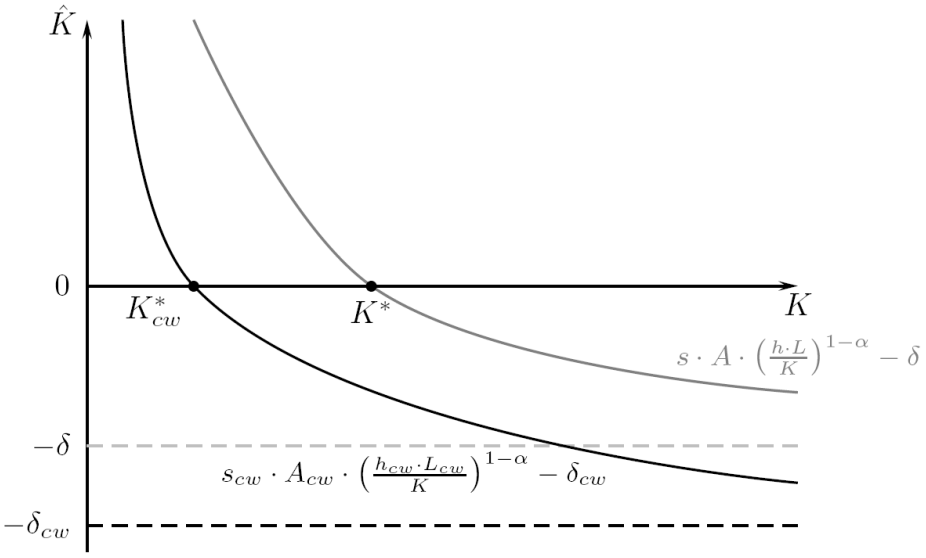
K	L	A	h	s	δ	$\hat{L}$
–	–	–	–	–	+	–

While a pure reduction would just increase the growth rate of the capital stock, the other effects change the location and bending of the capital transition curve that the growth potential of the capital stock is lowered. This new situation is shown in figure 4, subscribed by $_{cw}$.

[3]Potential effects on total factor and labor productivity, $\hat{A}$ and $\hat{h}$ are also only considered in the growth rate of GDP, but not of the capital stock. They could arise from migration of human capital, but shall not be discussed in this paper.

Figure 4.

Change of the growth potential by a civil war



The impact of changes in the exogenous variables on steady state capital stock K^*, growth rate of the capital stock $\hat{K}$ and the growth rate of the GDP $\hat{Y}$ can be derived from equations (7), (6) and (3). The correlations are shown in table 2.

Table 2.

Correlations of the exogenous variables and steady state capital stock K^*, growth rate of the capital stock $\hat{K}$ and the growth rate of the GDP $\hat{Y}$

	K	L	A	h	s	δ	$\hat{L}$
K^*	0	+	+	+	+	−	0
$\hat{K}$	−	+	+	+	+	−	0
$\hat{Y}$	−	+	+	+	+	−	+

The implication of the applied growth model is: the pure reduction of the capital stock has a positive effect on both the growth rate of the capital stock and the growth rate of the GDP. But the impacts of war and civil war on the other sizes (labor force, productivity, saving rate, depreciations and labor force growth rate) worsen the potentials of the economy to recover.

5. Conclusion

The purpose of this paper was to examine in a theoretical way which effects war and civil war in Iraq have on the country's economic development. A simplified form of the neo-classical growth model by Solow (1956) was used and it was worked out, which effects the consequences of war and civil war should have on the single parameters of this model. Although a destruction of the capital stock is likely to enfold a higher growth rate, e.g. by targeted bombing of infrastructural facilities, disruption, diversion of public expenditure, dissaving and portfolio shifts are likely to reduce the country's opportunities for a complete recovery.

There are not yet any empirical studies about the growth effects of war and civil war in Iraq on Iraq itself. One reason is probably a lack of reliable data. But the effects of civil wars on economic growth based on a similar theoretical framework are studied in a general way (Murdoch and Sandler 2002; Murdoch and Sandler 2004, for example). A further task for research is to estimate these effects in the case of Iraq. There is much literature on the Iraq war's cost and effects on oil prices and western economies on the one hand, but a lack in literature about economic consequences for Iraq on the other hand.

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