Investigating the Effect of Initiating War on the Economic Performance of States

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1. Introduction

In 2003, a coalition of nations led by the United States launched an invasion of Iraq with the stated goals of removing weapons of mass destruction, combatting terrorism, and freeing the Iraqi people. The Bush administration faced significant criticism for the Iraq War, however, due to widespread belief that these stated goals were meant to appease the public and conceal the true monetary rationale of securing Western control of valuable Iraqi oil fields.

If states wage war for primarily economic reasons, then does the economic benefit of war truly justify the decision to go to war? This paper aims to investigate if such an economic benefit even exists by determining whether initiating a war is a statistically significant predictor of economic performance. Economic performance, as measured by annual percentage GDP growth, was analyzed via multiple linear regression analysis alongside the decision to initiate war and assorted control variables. The resulting models indicate no such benefit to the economy as a result of initiating war.

This paper offers three key contributions: it investigates the decision to go to war from a perspective not widely covered in literature, it introduces a more complex method of analysis via implementing growth-decay functions for variables, and it offers implications for policy makers in their foreign policy strategy.

The next section summarizes literature on what factors influence economic performance, including war and the varying proposed rationales behind the effect war may have. Section 3 follows by presenting a hypothesis that distinguishes between initiator and non-initiator states when investigating the effect of war on an economy. Section 4 then establishes the strategy for testing the hypothesis, followed by Section 5 which carries out these tests, and Section 6 concludes with limitations of the study, future improvements, and the implications of these tests.

2. Literature Review

War can be incredibly costly in multiple ways. There is obviously the immediate monetary cost of financing military production and logistics during wartime. The human cost of war necessarily means that there will be fewer people in the workforce due to casualties taking people out of the workforce, as well as causing many potential future workers to never be born due to societal and demographic change resulting from war. War is also generally harmful to the world economy as a whole, which can have negative implications for the economy of a state after a war due to the interconnectedness of the international economy in the modern age. (Bilmes & Stiglitz 2006; Glick & Taylor 2010).

This cost naturally begs the question of why states initiate war in the first place. There are three main perspectives in literature: First, initiating war results in net economic gains, since a state would not initiate a war that would not have net benefit (Wallsten & Kosec 2005; Hausken 2016). Second, while initiating war results in net cost to the state, war is the least costly option to address the aims that are sought to be achieved through war (Thirring 1953; McMahan & McKim 1993). For example, Davis et al. (2006) investigates the cost of continued sanctions and other containment actions on Iraq versus the cost of direct military involvement, and concludes that military action incurred fewer losses than potential continued containment of the Hussein regime. Third, some wars are initiated for non-economic reasons, such as for ideological or security reasons, and thus net economic cost is exchanged for net benefit in other areas (Hausken 2016; Glaeser 2016; Coulomb 2022).

This, however, assumes that the decision to initiate war is made by perfectly rational actors. Another popular perspective is that going to war can be an irrational decision made through faulty logic or flawed information such as underestimating the opponent or misjudging

international opinion (Thirring 1953). In this case, it may be expected that initiating wars could lead to net loss simply due to flawed justification for the war in the first place – indeed, there are many examples of war initiators incurring massive costs for seemingly little gain, such as the Arab League after the first Arab-Israeli War or the Soviets after their invasion of Afghanistan. (White 1990).

However, the model proposed by Hausken (2016) offers possible counterargument to White by arguing that while these wars may have incurred significant *economic* cost for the initiators, they may have seen gains in non-economic areas. For example, the war may have saved lives due to achieving war aims, or it may have afforded the initiator state "influence," which Hausken defines as "political, economic and symbolic prestige, power, [or] the ability to determine subsequent developments and priorities in world affairs, etc." Hausken argues that different actors may attribute different weights to the gain or loss of human life, economic value, or influence, which may rationalize the wars pointed to by White as net losses for the initiator state. Still, Hausken's model compares human life or influence gains to economic gains by estimating their economic value, which may imply that even wars which fall into the third category should see net economic gain in the long term. Indeed, gained influence following World War II is widely believed to be one of the most important factors in propelling the United States to becoming the superpower (economic and otherwise) that it is today (Immerwahr 2019, Bapat 2019).

Still another important perspective to consider is that the analysis of these benefits are inherently flawed, as they take the initiators at their word by judging their war gains by their stated war aims. Initiator states may justify their actions with ideology in order to maintain a base of support among domestic and international communities, while their actual war aims are

economic in nature (McMahan & McKim 1993; Bapat 2019). Additionally, treating states as monolithic actors in their decisions to initiate wars may also be a flawed assumption. The decision to declare war may lie in the hands of an executive whose goals do not necessarily align with that of the state as a whole, leading to an initiator state incurring the cost of war for some individual political benefit (Glaeser 2006; Coulomb 2022).

Regardless of the decision to initiate war, going to war still incurs costs which need to be recovered from, whether via gains achieved from war or from an economy damaged by the war. The neoclassical model of economic growth proposed by Solow (1956) and Swan (1956) illustrates a so-called "Phoenix factor," coined by Organski & Kugler (1977), wherein economic growth is accelerated following before economies return to their pre-war performance levels. This is explained to be a result of the same amount of resources being invested into an economy having greater effect on poorer economies than richer ones, provided both economies have the same "steady state" (the point at which capital is stable). In other words, if an economy is moved away from its steady state due to economic damage suffered in war, the period of economic recovery will see greater growth than peacetime economic growth.

On the other hand, the OLG model proposed by Samuelson (1958) and Diamond (1965) offers an alternative to rapid economic growth following war: permanent decline to a new economic steady state with less capital than pre-war conditions, or if the state is poor enough, fall into a "poverty trap" where the state continues losing capital and foreign aid or other external investment becomes ineffective. This model is consistent with observations from Kugler et al. (2013), which found that more economically developed states recovered more quickly from war than less developed states, hypothesized to be as a result of the ability for more developed states to preserve human capital, thus being able to make the most out of post-war baby booms, while

with less developed states such baby booms without the same level of human capital are more of a detriment to economic performance. This shows that the Solow model may not be perfectly accurate, at least in the case of the wars investigated by Kugler et al.

At the time of writing, analysis from an economic perspective on the decision to go to war is limited. While White (1990) and Coulomb (2022) make observations on the economic recovery of certain initiator states, they do not make comparisons to the economic recovery of non-initiator states. That comparison is what this paper aims to address.

3. Theory

To investigate the effect of initiating war on the economy of a state, this analysis will consider the effects of political, economic, and demographic factors on the economy of the state in order to control for their effects and isolate the effect of initiating war. In order to hypothesize the effect of initiating war on the economy of a state, some assumptions must be made on what kind of state initiates wars. It will be assumed that states will act more rationally than irrationally when deciding to wage war. This means that states will *only* pursue war if it is deemed the most beneficial option – or the least detrimental option, as argued by Thirring (1953), McMahan & McKim (1993), and Davis et al. (2006). Importantly, this implies that states will not attempt to pursue wars that they think will result in net loss, nor will they attempt to pursue wars wherein they believe that their war aims are not reasonably achievable.

It will also be assumed that the aims of the state and the leader will roughly align, regardless of whatever differences may exist. Thus, the leader will at least act in a way that is economically beneficial in some way to the state, whether directly or indirectly (i.e., increasing the state's influence will be beneficial to the leader). In other words, it will be assumed that

heads of state will also not choose to pursue wars that are economically damaging to the state. Meanwhile, non-initiator states may not have the luxury of choosing which wars they become involved in. In other words, while initiator states may be able to limit their involvement in wars to those they believe to be beneficial, non-initiator states may become involved in wars that are detrimental to the economy.

If states will only initiate wars if they reasonably believe that they can achieve their war aims, then it stands to reason that more powerful, economically developed states with greater capacity to achieve any war aims will be the ones more likely to initiate wars than their less powerful counterparts. Since more developed states recover more quickly from wars (Kugler et al. 2013), this assumption implies that initiator states will be the ones more able to recover from wars and thus prove to recover more quickly than non-initiator states.

Furthermore, we can expect that the meeting of war aims to have additional economic benefit to the state. Thus, if initiator states are more likely to achieve their war aims in the process of invasion due to having greater power than non-initiator states, then this is another assumption that supports the notion of initiator states performing better than non-initiator states. Due to the plausible relationship between state power, war initiation, and economic performance, this analysis will attempt to control for state power. While White (1990) may argue that aggressor states often do not succeed in their war aims, the interaction noted by Kugler et al. (2013) and prior assumption still hold: even if the initiator state does not succeed in its war aims, it is still more likely to be more economically developed than a non-initiator state, and thus have the capacity to recover more successfully than a non-initiator state.

In summary, it is hypothesized that initiator states will perform better than non-initiator states due to an assumption that they will be unlikely to pursue non-beneficial wars and more likely to have the capacity to recover from those that are non-beneficial.

As this analysis aims to compare aggressor and non-aggressor states in their economic recovery after war, analysis was limited to inter-state wars as defined by the Correlates of War (COW) Inter-State War dataset.

4. Research Design

In order to standardize the measurement of "economic performance" between differently sized economies (i.e., to ensure that analysis between a more wealthy initiator state and a less wealthy non-initiator state does not automatically favor the initiator state because it happens to be an more wealthy, or vice versa), economic performance was measured in terms of annual percentage GDP growth. Analysis consisted of a series of multiple linear regression models to investigate which variables are significant predictors of percentage GDP growth. Data for percentage GDP growth rate were retrieved from the World Bank.

War data were taken from the Correlates of War Inter-State War dataset[1]. This dataset consisted of rows corresponding to each state that fought in a given war, and contained the following variables of interest: whether that state initiated a war, the outcome of the war for that state, and the battle deaths suffered by that state during the war. First, the outcome of the war was re-coded as a 1 if the war resulted in victory for the state, and 0 for all other responses (loss, compromise, stalemates, etc.). I then introduced a new variable indicating whether or not the war was fought on that state's home soil, hand-coded as 1 if it was and 0 if it was not. This hand-coding only covered wars after 1960, as Country-Year data for the dependent variable of

[1] Version 4.0

percentage GDP growth rate did not extend past this point. Finally, battle deaths were re-coded to be as a percentage of the total population to equalize comparisons of this variable between different sized states.

I then inserted these variables into the dataset in the following manner: During the duration of the war, the value of the variable of concern would grow linearly from 0 to its full value. Then, the value would decay linearly back to 0 over the course of a 10 year recovery period. During peacetime, values for all the above variables would be set to 0. Finally, values were shifted by a 1 year lag. Hypothetical data is demonstrated in Table 1.

Table 1: Hypothetical data for an Initiator State that suffered 10,000 Battle Deaths

Year	Initiator	Battle Deaths
1951	0	0
1952	0.5	5,000
1953	1	10,000
1954	0.9	9,000
1955	0.8	8,000
1956	0.7	7,000
1957	0.6	6,000
1958	0.5	5,000
1959	0.4	4,000
1960	0.3	3,000
1961	0.2	2,000
1962	0.1	1,000
1963	0	0

Note: Red shaded cells indicate years during which the war occurred. Green shaded cells indicate the 10 year recovery period.

While the growth and decay functions did transform standard dummy variables (whether the state initiated the war, whether the state won the war, and whether the war was fought on home soil) into interval level variables, the growth and decay of the values of these variables should hopefully correspond with the growth and decay of the effect a war has on the economy as time passes. This creates the effect of these previously dichotomous variables having minimal influence at the war's start, growing to maximal influence by the war's end, and then decaying back to no influence over the course of the recovery period. A 10 year recovery period, around half a generation, was selected as an estimate for when a society considers a war to no longer be recent.

I also utilized a 1 year delay, as it is not expected that the effects of war will materialize within less than a year; the beginning of growth and decay of variable measurements should especially not start on the year the war starts and ends respectively if such an event occurs late into the year, as this would leave less than a year for such events to take effect.

I then merged Country-Year data for various political, economic, and demographic indices into the dataset as control variables. Foreign Direct Investment (FDI), inflation, and interest rate data were likewise taken from the World Bank. Consistent with work done in Albu (2006) and Ali & Khurram (2017), it is expected that these variables will have a significant effect on GDP growth rate.

From Kugler et al. (2013), it was hypothesized that population, state capacity, and government corruption may have significant effects on GDP growth rate as well. Increased levels of government corruption may result in less effective allocation of funds and resources to the needs of the state, resulting in poorer economic performance. Thus, these data were also merged into the Country-Year data, with population data sourced from the World Bank, state capacity

data sourced from Hanson and Sigman (2021)[2], and corruption data sourced from Transparency International (2018)[3]. Kugler et al. also pointed to the relationship between foreign aid, regime type, and GDP growth rate, and so these variables were also inserted as controls. Foreign aid data were obtained from the OECD[4], and regime type data were obtained from the V-Dem dataset[5]. Regime type data were re-coded as 1 for democracies, and 0 for autocracies in the merged dataset.

Finally, to control for assumed correlation between state power and recovery rate described in the theory section, I merged variables from the COW National Material Capabilities data[6] into the dataset. The variables comprising this dataset included iron and steel production, primary energy consumption, urban population, total population (unused in analysis, as the World Bank data for population was a more comprehensive dataset for this variable), military expenditure, number of military personnel, and the Composite Indicator of National Capability (CINC).

A number of datasets had multiple missing entries for a given country or year, presumably due to difficulty collecting data on a state during a time of crisis. Due to the merging of many variables from multiple datasets, these holes in the data drastically reduced the number of observations that had values for every single variable. Thus, in order to maximize the number of observations that linear regression models could use to estimate coefficients, I only excluded observations if there were missing observations in the variables in use by that particular model, while allowing for years where that country had no data for variables not in use by that particular model.

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[2] With major processing done by Our World in Data.
[3] Processed by Our World in Data.
[4] With minor processing done by Our World in Data
[5] Processed by Our World in Data.
[6] Version 6.0

In order to assess the usefulness of initiating war as a predictor of economic performance, I first estimated coefficients for a few models based on subsets of the control variables, after which I performed linear regression on models including the independent variable of initiating war alongside control variables. By observing the effect of including the independent variable on the significance of control variables, particularly those with significance already established in previous literature, I hope to determine the usefulness of initiating war as a predictor of economic performance.

Model 1 analyzes the independent variable on its own, to determine whether it has any relationship with the dependent variable. Model 2 analyzes variables found in the National Material Capabilities dataset, to see whether the relationship between state power and its economic recovery holds. Model 3 tests variables related to the economy. Models 4 and 5 test all control variables together, with model 4 using all variables used to calculate the CINC score separately while model 5 uses the CINC score on its own. Models 6 and 7 then insert the initiator variable into models 4 and 5, respectively, to see how the significance of each coefficient is impacted. Non-dummy variables were standardized for analysis in order to ensure models did not prioritize variables that were measured on greater scales.

5. Results

Model results are summarized in the following three tables, presenting progressive additions to the variables analyzed in each model.

Table 2: Linear Regression Models of Independent Variable and Categories of Control Variables Separately

Dependent Variable: Annual percentage GDP growth rate

	(1)	(2)	(3)
Initiator	0.186*** (0.069)		
Iron & Steel Prod.		0.028 (0.025)	-0.014 (0.019)
Energy Consumption		-0.063 (0.038)	
Military Expenditure		-0.009 (0.020)	0.295*** (0.110)
Military Personnel		0.077** (0.033)	
Urban Population		0.001 (0.026)	
Total Population		0.293 (0.194)	
Foreign Aid			0.763*** (0.181)
FDI			0.717*** (0.109)
Inflation			-0.073*** (0.020)
Interest Rate			0.028 (0.017)
Constant	-0.003 (0.009)	0.113** (0.053)	0.316*** (0.048)
Observations	13,884	8,345	2,848

Note: Cell entries are standardized coefficients with standard errors in parentheses
*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

It can be seen from model 1 that without any control variables, the coefficient for the decision to initiate war is highly significant and positive, which implies a positive correlation between initiating war and economic performance. Model 2 shows that only the coefficient for military personnel is significant, while all other coefficients for variables comprising the CINC score are insignificant. This implies a positive correlation between the amount of military personnel a state has and its economic performance, though it is more likely that a better performing economy has larger militaries than larger militaries leading to better economies.

Model 3 shows that the coefficients of most variables related to the economy (with the exception of iron & steel production and interest rate) are significant. Again, it is more likely that better performing economies spend more on defense than defense spending leading to better performing economies. Correlation between economic variables and the dependent variable otherwise follows conventional wisdom.

Table 3: Linear Regression Models of All Control Variables
Dependent Variable: Annual percentage GDP growth rate

	(4)	(5)
Victory	0.381 (0.242)	0.520** (0.224)
Battle Deaths	-0.065 (0.089)	-0.032 (0.087)
War at Home	0.866*** (0.238)	0.787*** (0.230)
Iron & Steel Prod.	0.030 (0.069)	
Energy Consumption	-0.037 (0.131)	
Military Expenditure	0.082 (0.154)	
Military Personnel	0.102 (0.063)	
Urban Population	-0.028 (0.033)	
Total Population	0.161 (0.271)	
CINC score		0.137*** (0.038)
Democracy	0.303 (0.221)	0.349* (0.210)
State Capacity	-0.092* (0.048)	-0.097** (0.047)
Foreign Aid	0.047 (0.029)	0.046 (0.028)
FDI	0.108** (0.043)	0.105** (0.041)
Inflation	0.924*** (0.126)	0.920*** (0.126)
Interest Rate	-0.067*** (0.021)	-0.066*** (0.021)
Constant	0.021 (0.018)	0.020 (0.018)
Observations	2,379	2,379

Note: Cell entries are standardized coefficients with standard errors in parentheses
*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

Considering all control variables together, it can be seen that the coefficients for whether war was fought within that country, state capacity, FDI, inflation, and interest rate are statistically significant. When consolidating the composite variables into the single CINC score variable, victory, all coefficients except for those associated with foreign aid and battle deaths become significant. Additionally, the coefficient for the CINC score itself is significant, whereas none of the coefficients for its composite variables were significant.

Table 4: Linear Regression Models of All Variables
Dependent Variable: Annual percentage GDP growth rate

	(6)	(7)
Initiator	-0.907*** (0.305)	-0.425* (0.249)
Victory	0.358 (0.242)	0.581** (0.227)
Battle Deaths	-0.111 (0.091)	-0.033 (0.087)
War at Home	1.258*** (0.272)	0.916*** (0.242)
Iron & Steel Prod.	0.027 (0.069)	
Energy Consumption	-0.026 (0.131)	
Military Expenditure	0.050 (0.154)	
Military Personnel	0.223*** (0.075)	
Urban Population	-0.038 (0.033)	
Total Population	-0.011 (0.276)	
CINC score		0.151*** (0.039)
Democracy	0.263 (0.221)	0.359* (0.210)
State Capacity	-0.090* (0.048)	-0.102** (0.047)
Foreign Aid	0.044 (0.029)	0.044 (0.028)
FDI	0.104** (0.043)	0.104** (0.041)
Inflation	0.920*** (0.126)	0.918*** (0.126)
Interest Rate	-0.066*** (0.021)	-0.066*** (0.021)
Constant	0.019 (0.018)	0.019 (0.018)
Observations	2,379	2,379

Note: Cell entries are standardized coefficients with standard errors in parentheses
*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

It can be seen that even when including control variables in the model, the coefficient of the decision to initiate war remains highly statistically significant, and is negatively correlated with GDP growth. However, it loses significance (though still has a p-value which falls under the widely used α of 0.05) when CINC variables are consolidated into the single CINC score. Significance of the coefficients of control variables remain mostly similar to models 4 and 5. Military personnel and CINC score were positively correlated with the dependent variable in the models, which is consistent with the assumed relationship between state power and economic performance. However, neither these correlations nor the assumptions in the previous section are consistent with the negative correlation between state capacity and the dependent variable.

6. Conclusions

Wars come with unimaginable cost, not just to the states that wage them, but to the people that have to suffer through them. With such costs associated with war, do there really exist benefits that rationalize the decision to begin them? Literature is divided on the topic, though there is little investigation into the impact of specifically initiating a war as opposed to war as a whole. It is reasonable to assume that initiating a war must result in economic benefit in order to rationalize the decision. However, the analysis conducted in this paper provides sufficient evidence to reject the null hypothesis and suggests that the decision to initiate war is associated with economic detriment. This direct interpretation of findings is consistent with White (1990), and implies that it may be more effective to pursue economic growth via more peaceful means.

However, the Solow model of economic recovery could possibly explain these findings. This analysis focused on GDP growth rate to equalize comparison of "economic performance" between states of differing size economies – however, since absolute measures of GDP growth were not included to avoid collinearity with the dependent variable, the measure of economic performance makes no distinction between a state recovering from loss and a state experiencing a period of economic expansion. The Solow model, importantly, shows that states that suffer more damage and move farther away from their steady state will experience faster growth than states that do not experience such loss in capital – or, perhaps, faster growth than the state that initiated the war and thus suffered less economic damage (the OLG model also shows this, provided the state has sufficient starting capital at the time of recovery). This could also explain why having the war fought on home soil had a positive and highly significant coefficient, as such states may have experienced more capital loss and thus faster subsequent recovery to the steady state. This does not, however, explain why state capacity had a negative and highly significant coefficient, as it would be expected a more effective state could manage resources for the purposes of economic recovery more efficiently.

Analysis may be limited by the fashion in which variables from the COW Inter-State War dataset were coded. The specifications of the growth and decay functions were not based on prior methodology from literature, and thus there is no guarantee that the growth and decay of the effects of war are linear, nor is there any guarantee whether the values of these variables should be grown and decayed as they were. Additionally, the period of time an economy takes to recover from war varies from state to state, and so a 10 year decay function to simulate recovery from war may not be entirely accurate. Future studies may remedy this easily by adjusting parameters of the coding of these variables, once rationale for such changes are found in

literature on the recovery of states from wars. Analysis was also limited by the exclusion of a few economic/demographic indicators that may have had an impact on economic performance, such as health expenditure, due to a lack of data that did not allow for sufficient observations to train regression models. The lag time of one year may also not have been sufficient to allow for the impact of war on the economy to turn from detriment to benefit. If future studies are able to find more comprehensive datasets for these controls, inclusion of these controls may change the significance of certain variables' coefficients.

Additionally, analysis was fairly simple in terms of computation. A more robust model may be created by employing techniques such as interaction terms, linearization of variables not expected to have a linear relationship with the dependent variable, regularization of models, or cross-validation. Further research may find a more robust predictor model, which may produce different conclusions on the effect of the independent variable or other control variables. However, this research indicates that the decision to initiate war is not a viable economic strategy, and encourages states to weigh the costs of war more carefully.

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