

# **Economic Consequence of Conflict:** *Recovery or Bust*

Tadeusz Kugler

Jacek Kugler

Kyungkook Kang

IPES, November 2010

# Overview

- Limited and contradictory analysis has thus far emerged from the study of recovery from war.
- This research is motivated by the disparity between existing policy accounts and empirical assessments of post war recovery.
- We focus on the degree to which belligerents at various stages of political and economic development recover from severe wars. How do political, demographic or economic factors motivate these differences.
- Can domestic or foreign actors alter recovery dynamics.

# Previous Accounting of War Recovery Patterns

- Keynes (1920)

War losses would linger unless devastated participants were provided with a massive infusion of foreign aid (Marshall Plan).

- Angell (1933)

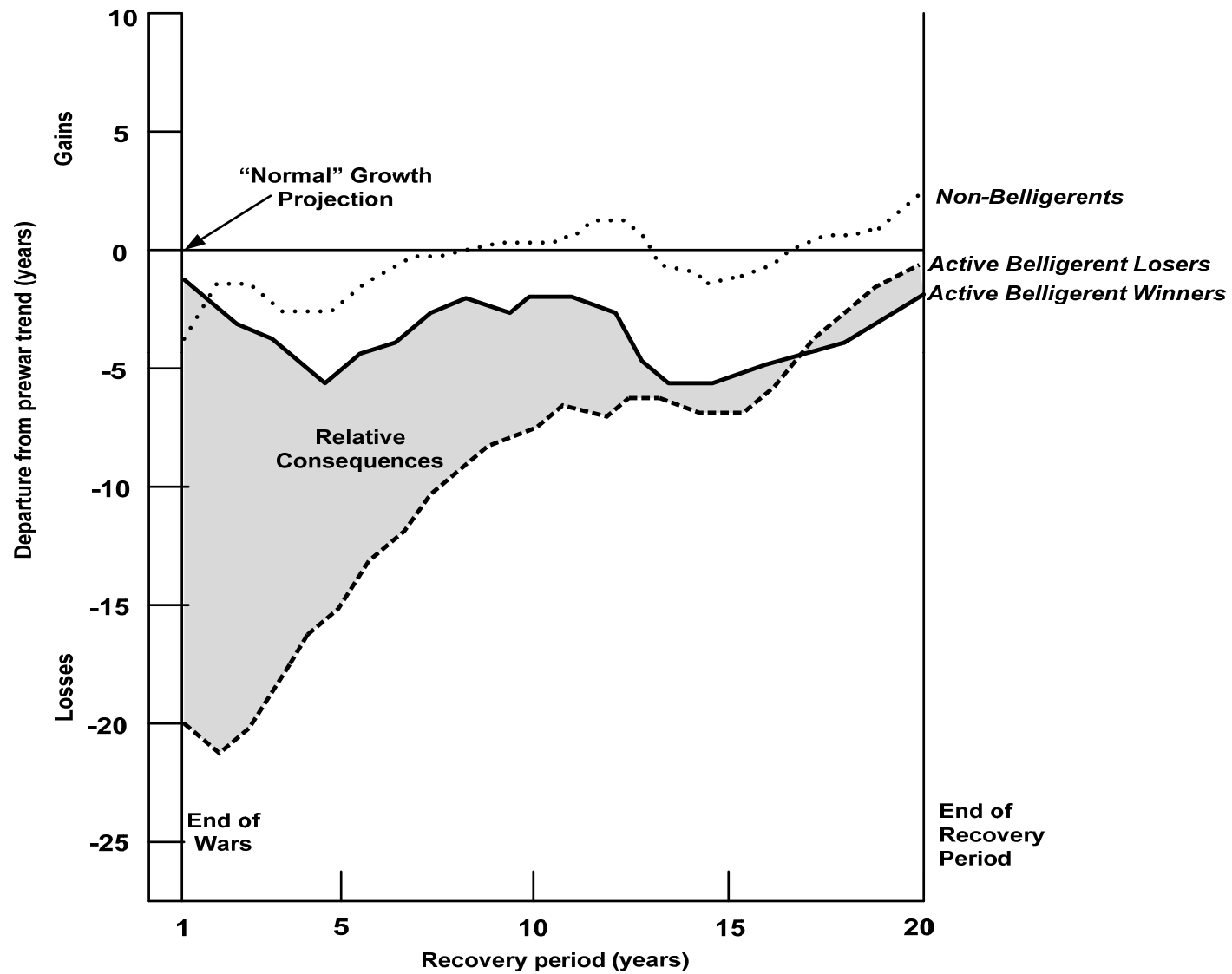
The devastation of major war remains and ensnares participants into a poverty trap of expanding population and decreasing per capita income. Averting war was Angell's counsel.

- Organski & Kugler (1979, 1980) Arbetman & Kugler (1989):

Nations engaged in World Wars recovered their pre-war wealth and productivity within a two decade (The Phoenix Factor). Serious short term losses compensated within one generation.

# Empirical Evidence about the Consequences of War

## The “Phoenix Factor”



Source: War Ledger (Organski and Kugler 1980)

# Phoenix Factor Relation to the Solow Growth Model

The Phoenix Factor proposition is consistent with the capital accumulation model advanced by Solow (1956) and Swan (1956)

$$K_{t+1} - K_t = sY_t - \delta K_t$$

Next Period's Capital    Current Period's Capital    Total Savings    Depreciation

The diagram shows the equation  $K_{t+1} - K_t = sY_t - \delta K_t$ . Below the equation, four labels are positioned: 'Next Period's Capital' under  $K_{t+1}$ , 'Current Period's Capital' under  $K_t$ , 'Total Savings' under  $sY_t$ , and 'Depreciation' under  $\delta K_t$ . Red arrows point from each label to its corresponding term in the equation.

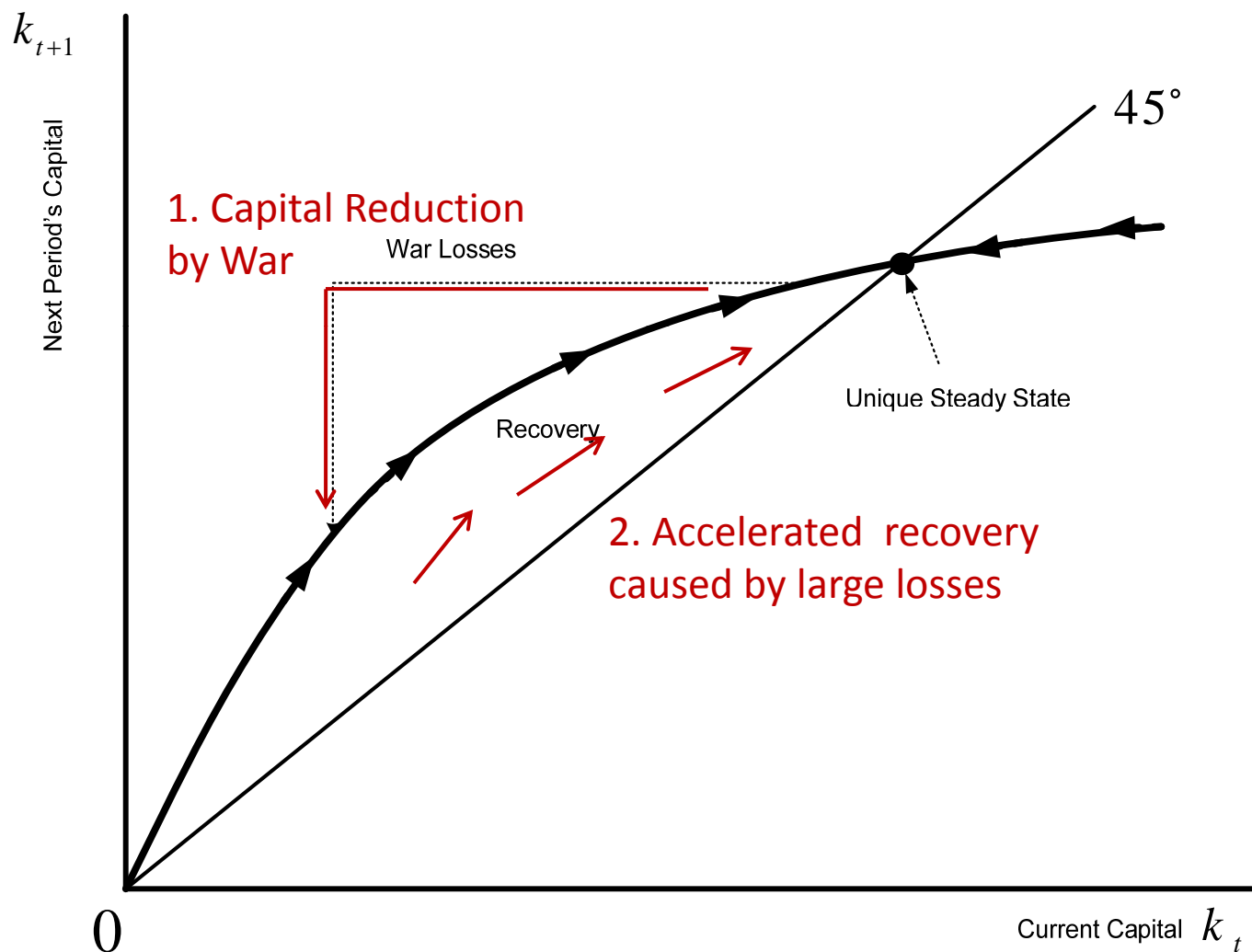
The Process of Recovery in physical capital per capita is

$$(1+n)k_{t+1} = sf(k_t) + (1-\delta)k_t$$

Population Growth    Saving Rate    Depreciation Rate

The diagram shows the equation  $(1+n)k_{t+1} = sf(k_t) + (1-\delta)k_t$ . Below the equation, three labels are positioned: 'Population Growth' under  $(1+n)$ , 'Saving Rate' under  $s$ , and 'Depreciation Rate' under  $\delta$ . Red arrows point from each label to its corresponding term in the equation.

# Absolute Recovery with Original Phoenix Factor



## Empirical Challenges to the Phoenix Factor

Empirically the Phoenix Factor recovery pattern applies to developed societies *but* Kuznets (1973) Wheeler (1975) Kugler and Arbetman (1989) & Kugler and Kugler (2009) show that some developing nations do not fit the Phoenix Factor pattern.

# Revised Recovery Pattern - OLG Model

1. Firm maximize profits

$$\max_{k_t} f(k_t) - R_{t+1}k_t - w_t$$

Production
Capital Cost
Labor Cost

2. Individual maximize life-time utility

$$\max_{c_t^1, c_{t+1}^2} \left[ (1-\beta) \ln(c_t^1) + \beta \ln(c_{t+1}^2) \right] \quad s.t. \quad c_t^1 = w_t - a_{t+1} \quad c_{t+1}^2 = R_{t+1}a_{t+1}$$

Utility in Young Period
Utility in Old Period
Consumption when Young (Wage-Saving)
Consumption when Old (Return from Saving)

3. The Process of Recovery in Physical Capital ( $k$ ) per capita is

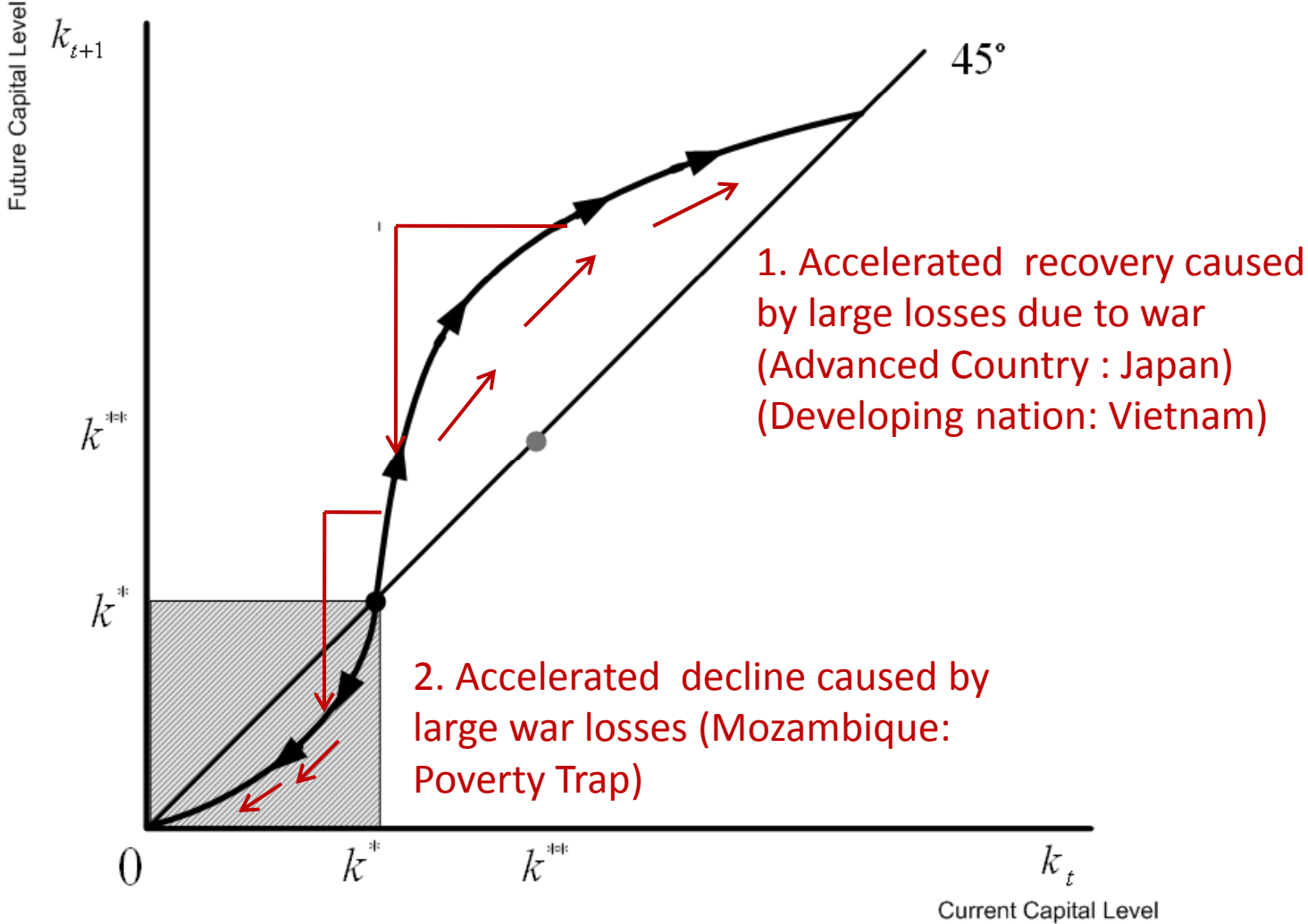
$$k_{t+1} = \frac{a\beta A}{1+n} \left[ \ln(1+k_t) - \frac{k_t}{1+k_t} \right]$$

Human Capital
Political Capacity
Physical Capital

Individual Saving
Population Growth



# Recovery in OLG Model



# Insights for Post-War Recovery

1. Saving and low fertility facilitate recovery from war.
2. Nations recover from war follow different patterns
  - a. Above the threshold

The rate of recovery increases with proximity to the threshold.  
Foreign aid accelerates recovery.
  - b. Below the threshold

The rate of recovery decreases with proximity to the threshold  
Foreign aid reduces suffering but does *not* accelerate recovery.
3. Recovery patterns depend on prewar performance & political capacity:

	High Political Capacity	Low Political Capacity
Developed Economy	Rapid Recovery with Full Convergence	Less Rapid Recovery with Limited Convergence
Developing Economy	Rapid or Tenuous Recovery (political choices important)	No Recovery or Decline into a Poverty Trap

# Preliminary Selection Criteria

Domestic and International conflicts that produce a population loss of 2.5% or more

War	Belligerent	End Year	Population Loss
Cambodia vs. Khmer Rouge of 1978	Cambodia	1979	25.6%
World War II	Poland	1945	20.5%
Korean War	North Korea	1953	15.3%
Rwanda vs. Patriotic Front	Rwanda	1994	14.5%
World War II	USSR	1945	10.0%
World War II	Yugoslavia	1945	9.7%
Mozambique vs. Renamo	Mozambique	1992	9.1%
Cambodia vs. Khmer Rouge of 1970	Cambodia	1975	8.3%
World War II	Germany	1945	7.6%
Liberia vs. NPFL & ULIMO	Liberia	1995	7.6%
Vietnamese War	Vietnam, South	1975	7.0%
Angola vs. UNITA of 1975	Angola	1994	6.7%
USSR vs. Mujahedin	Afghanistan	1989	6.6%
Sudan vs. SPLA-Garang Faction	Sudan	1997	5.9%
World War II	Austria	1945	5.7%
Lebanon vs. Leftists of 1975	Lebanon	1990	5.3%
World War II	Hungary	1945	5.3%
Vietnamese War	Vietnam, North	1975	4.7%
World War II, Pro-West vs. Communists	Greece	1945	4.5%
Somalia vs. Clan Factions	Somalia	1997	4.5%
World War II	Romania	1945	3.7%
Burundi vs. Hutu of 1993	Burundi	1997	3.7%
Burundi vs. Hutu of 1972	Burundi	1972	3.4%
Sudan vs. Anya Nya	Sudan	1972	3.3%
Korean	South Korea	1953	3.1%
World War II	Albania	1945	3.0%
World War II	Japan	1945	2.7%

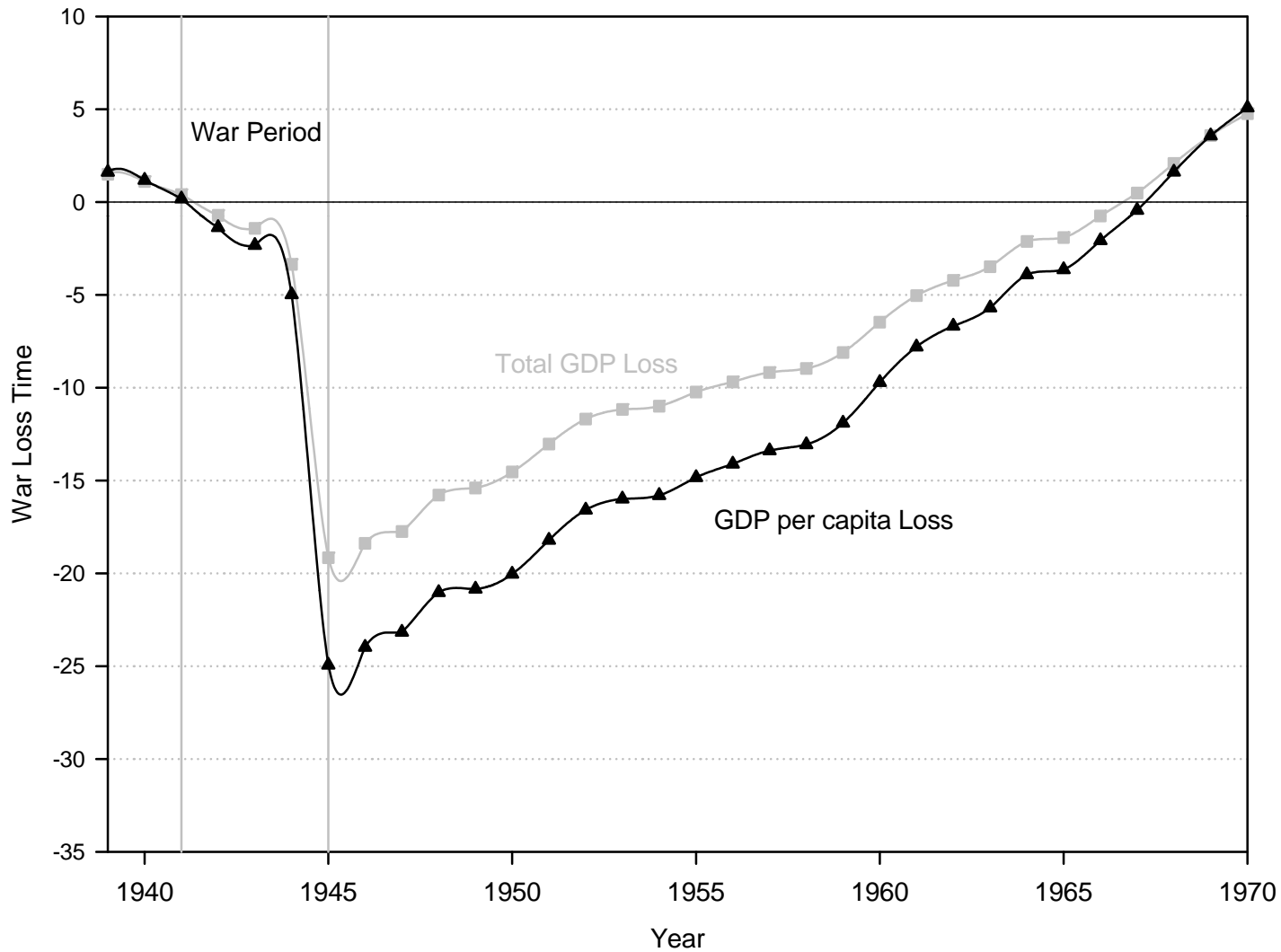
Source: Cunningham and Lemke, 2009

## Estimation

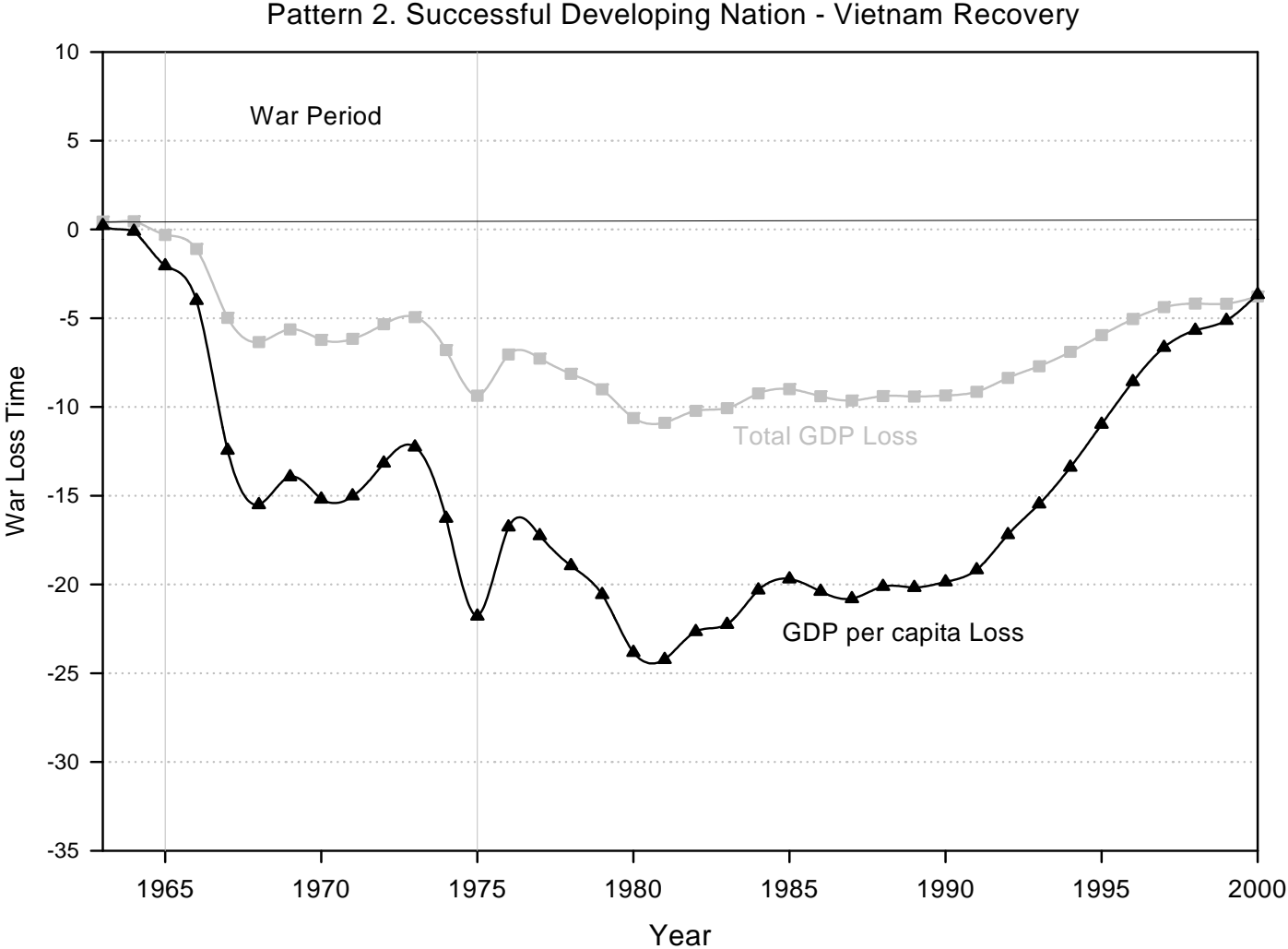
- Forecast the GDP trajectories assumes that nations would sustain the logarithmic trends of the pre-war period for the next 15 years plus the conflict period (Kaldor 1961).
- GDP war time loss is standardized by estimating foregone years:
  - $\text{Time} = b_0 + b_1 \ln(\text{GDP})$
  - $\text{Time Loss in Post-War Period} = \text{Predicted Time} - \text{Time}$
- Standardized estimates allow direct comparison of large and small societies during different levels of development & historical periods.

# 1. Recovery for a Developed Nation

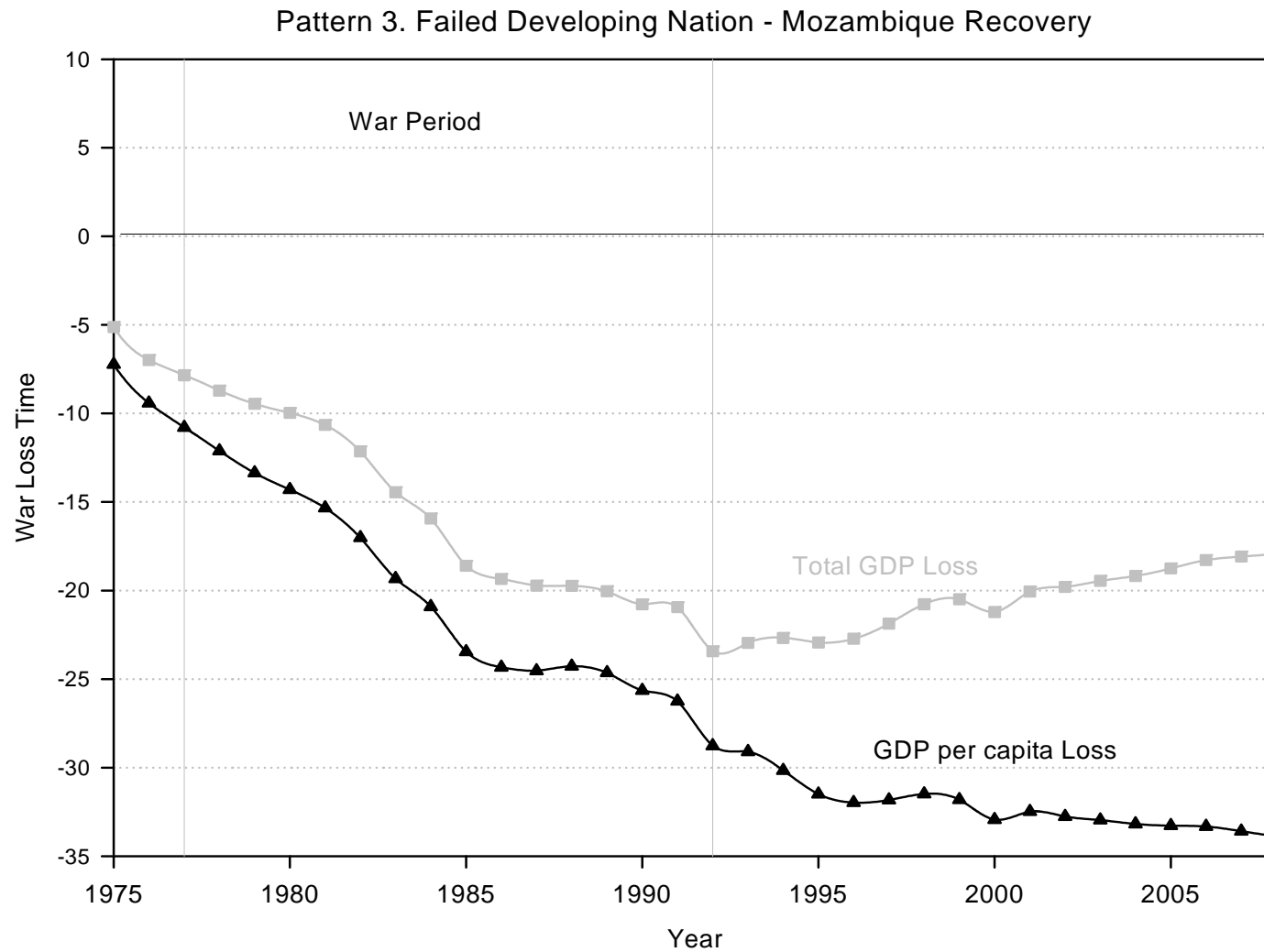
Pattern 1. Developed Nation - Japan Recovery



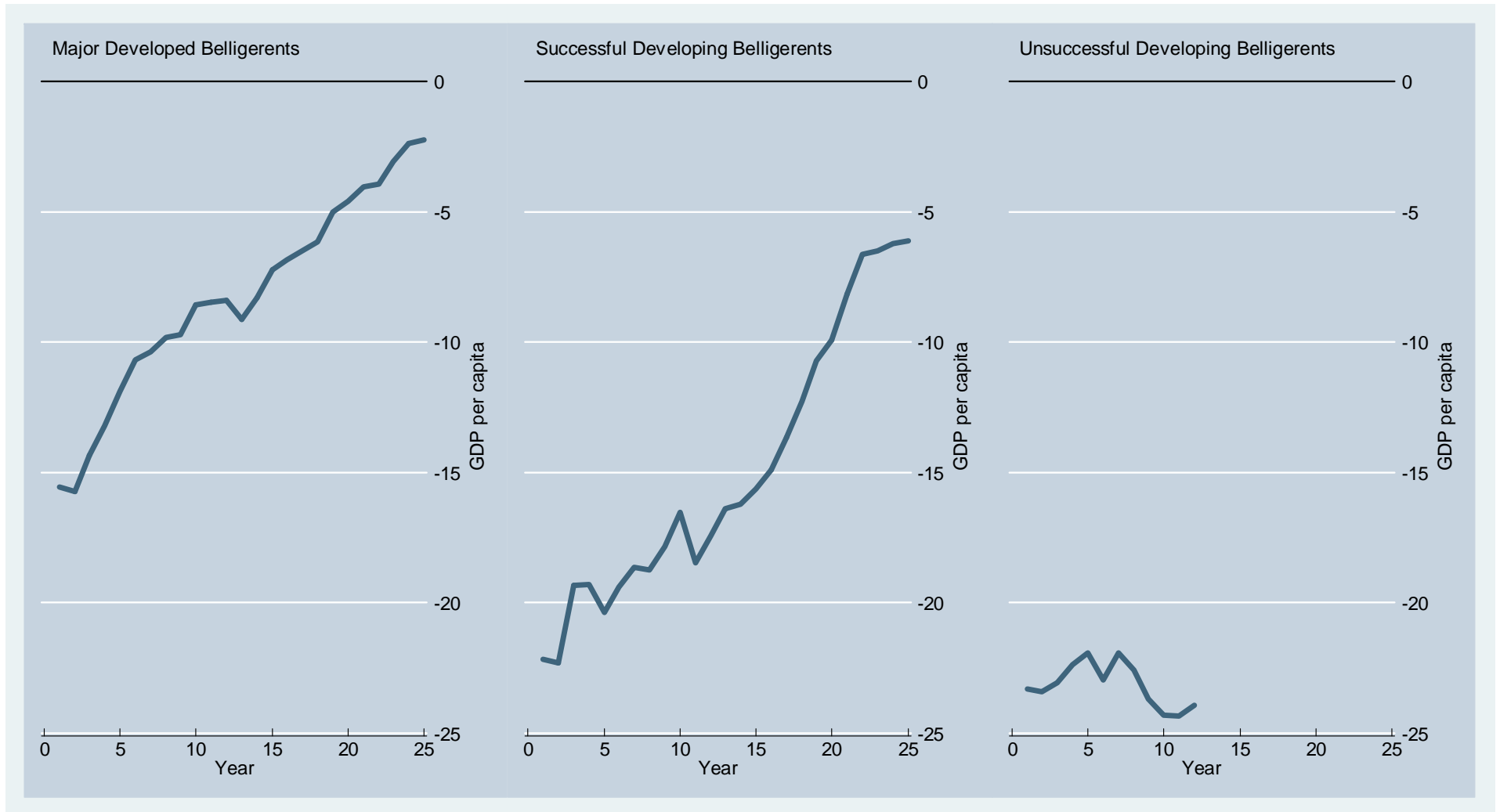
# 2. Recovery for a Successful Developing Nation



# 3. Recovery for a Failing Developing Nation



# Preliminary Results: Average GDP Lost Years due to War





# Goals

- The OLG Growth Model implies that policy options will differ across levels of development and will be conditioned by political factors.
- Further systematic exploration of recovery from war could identify the actions nations can take to help themselves or others. Such knowledge may be useful to ameliorate the effects of man-made wars & natural disasters.
- Objective is to help policy makers anticipate the outcome of alternate funding practices during postwar conditions.
- We want to test implications with real conditions. Iraq and Afghanistan are the obvious cases of current conflict where recovery challenges are pertinent.
- Clarifying what foreign actions are politically feasible could minimize human suffering and help to make foreign aid choices more rational.