

“War Inc. or Peace Inc? Firms, War and Political *Micro*–Economy of International Conflict”

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Motivation & Contribution

- Economic Impact of War
- Twofold contributions
 - First: a focus on micro-level, firms in particular, as opposed to macro-level
 - Second: differentiation of multiple aspects of war microeconomic impact
 - Systemic *versus* Sectoral
 - Short-term *versus* Long-term

Theory

War and Economy

- Negative Impact
 - destroys human and physical capital
 - dislocates resources from their productive uses
 - disrupts economic exchanges by increasing uncertainty and transaction costs
- Positive impact
 - a positive demand shock via increased government spending
 - a positive technology shock by contributing to the innovation and adoption of new technologies

Theory

- A two-sector dynamic general equilibrium model (Ramey & Shapiro, 1998a, 1998b; Rogerson, 1987)
- the augmented Codd-Douglas production technology (Barth and Cordes, 1980; Aschauer, 1988; Ramirez, 1994)

$$Y_{it} = AK^{\alpha}_{it}L^{\gamma}_{it}KG^{\beta}_t \quad i=1, 2$$

Theory

- Frictions in capital reallocation across sectors

$$K_{it+1} = (1-\delta) K_{it} + I_{it} - R_{it}, \quad i=1, 2$$

$$K'_{it} = K_{it} - R_{it}, \quad i=1, 2$$

$$I_{Dt} = X_{Dt} + (1-\gamma) R_{Ct}$$

$$I_{Ct} = X_{Ct} + (1-\gamma) R_{Dt}$$

Theory

- Frictions in labor reallocation across sectors

$$L_{D,t+1} = L'_{D,t} + (1-\Omega)LR_{C,t}$$

$$L'_{D,t} = L_{D,t} - LR_{D,t}$$

$$L_{C,t+1} = L'_{C,t} + (1-\Omega)LR_{D,t}$$

$$L'_{C,t} = L_{C,t} - LR_{C,t}$$

Theory

- Preference

$$V = E_0 \sum (1+p)^{-t} \{ \log(C_{1,t}) + \theta \log(C_{2,t}) + \phi \log(T - L_{1,t} - L_{2,t+1}) \}$$

- *Resource Constraints*

$$Y_{Dt} = C_{Dt} + X_{Dt} + G_{Dt}$$

$$Y_{Ct} = C_{Ct} + X_{Ct} + G_{Ct}$$

Hypotheses

Hypothesis (1): Systemic, Short-Term

All else being equal, war has a negative short-term systemic impact on firm performance

Hypothesis (2): Systemic, Long-Term

All else being equal, war has a long-term systemic impact on firm performance.

Hypotheses

Hypothesis (3a): Sectoral, Short-Term

All else being equal, war has a negative short-term impact on firm performance in the civilian sector

Hypothesis (3b): Sectoral, Short-Term

All else being equal, war has a short-term impact on the performance of firms in the defense sector.

Hypotheses


Hypothesis (4a): Sectoral, Long-Term

All else being equal, war has a long-run impact on firm performance in the civilian sector

Hypothesis (4b): Sectoral, Short-Term

All else being equal, war has a positive long-term effect on firms in the defense sector.

Variables & Data

- Sample: 18978 US firms from 1960 to 2007
 - *Profitability*
 - Definition: Earnings before interest and taxes (EBIT), scaled with total assets
 - Data Source: Compustat
 - *Conflict*
 - Definition: The total number of interstate, intrastate and extrastate conflicts that the US is involved in a given year
 - Data Source: Correlates of War (COW)
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Variables and Data

Table 1. US Involvement In International Conflict

	<u>COW War Number</u>	<u>COW War Name</u>	<u>War Duration</u>
<u>Interstate Conflicts</u>			
	163	Vietnam War, Phase 2	1965-1973
	170	Second Laotian, Phase 2	1968-1973
	176	Communist Coalition	1970-1971
	211	Gulf War	1991
	221	War for Kosovo	1999
	225	Invasion of Afghanistan	2001
	227	Invasion of Iraq	2003
<u>Intrastate Conflicts</u>			
	748	Vietnam Phase 1	1961-1965
	756	Second Laotian Phase 1	1964-1968
	766	Dominican Republic	1965
	770	First Guatemala	1966-1968
	785	Khmer Rouge	1971-1973
	833	Fourth Lebanese Civil	1983-1984
	870	Second Somalia	1992-1994
	877	Bosnian-Serb Rebellion	1995
	932	Waziristan	2004-2006
	938	Third Somalia	2007
<u>Extrastate Conflicts</u>			
	481	Afghan Resistance	2001-2007
	482	Iraqi Resistance	2003-2007

Variables & Data

- *Size*

- Definition: the log of market capitalization, which is the shares outstanding times closing stock price at the end of fiscal year

- Data Source: Compustat

- *Leverage*

- Definition: the sum of long term debt and short term debt, scaled by the sum of book value of equity plus long term debt and short term debt

- Data Source: Compustat

- *Dividend:*

- Definition: The total dividend paid, scaled by sales

- Data Source: Compustat

Variables & Data

- *Cash*

- Definition: Cash holdings scaled by total assets
- Data Source: Compustat

- *Capital*

- Definition: Capital expenditure scaled by total assets
- Data Source: Compustat

- *R&D*

- Definition: Research and Development expenditure scaled by sales
- Data Source: Compustat

- *GDP*

- Definition: Gross Domestic Product at a constant price
- Data Source: Penn World Table

Variables & Data

- *GDP Growth*

- Definition: Annual change in the gross domestic product

- Data Source: Penn World Table

- *Inflation*

- Definition: An Annual change in consumer price Index

- Data Source: Penn World Table

- *Openness*

- Definition: Export plus import as a percentage of GDP

- Data Source: Penn World Table

- *Cold War*

- Definition: A dummy variable of 1 before 1991 and “0” after 1991

Variables & Data

- *Democrat*

- Definition: A dummy variable of “1” if Democrat and “0” if Republican

- *Defense*

- Definition: A dummy variable, 1 if a firm belongs to either one of the following industries, 0 otherwise

- **Gun** (sicnum ge 3760 and sicnum le 3769; sicnum ge 3795 and sicnum le 3795; sicnum ge 3480 and sicnum le 3489)

- **Shipbuilding** (sicnum ge 3730 and sicnum le 3731; sicnum ge 3740 and sicnum le 3743)

- **Aircraft** (sicnum ge 3720 and sicnum le 3720; sicnum ge 3721 and sicnum le 3721; sicnum ge 3723 and sicnum le 3724; sicnum ge 3725 and sicnum le 3725; sicnum ge 3728 and sicnum le 3729)

Model Specification– Systemic Effect

Single Equation Error Correction Model of Systemic Effect:

$$\Delta Profitability_{i,t} = \alpha + \beta_0 Profitability_{i,t-1} + \beta_1 \Delta Conflict_{i,t} + \beta_2 Conflict_{i,t-1} + \beta_3 \Delta Conflict_{i,t} * Defence_t + \beta_4 Conflict_{i,t-1} * Defence_t + \beta_5 Defence + \beta Controls + \delta + \Omega + \epsilon_{i,t}$$

δ : Industry Fixed Effect

Ω : Year Fixed Effect

$\epsilon_{i,t}$ = Robust standard error clustered by firms

Model Specification– Sectoral Effect

Single Equation Error Correction Model of Sectoral Effect:

$$\Delta Profitability_{i,t} = \alpha + \beta_0 Profitability_{i,t-1} + \beta_1 \Delta Conflict_{i,t} + \beta_2 Conflict_{i,t-1} + \beta_3 \Delta Conflict_{i,t} * Defence_t + \beta_4 Conflict_{i,t-1} * Defence_t + \beta_5 Defence + \beta Controls + \delta + \Omega + \epsilon_{i,t}$$

δ : Industry Fixed Effect

Ω : Year Fixed Effect

$\epsilon_{i,t}$ = Robust standard error clustered by firms

Empirical Results

Table 3. Single Equation Error Correction Model of Firm Profitability

	Systemic Effect		Sectoral Effect	
<i>Error Correction Rate</i>				
Profitability _{t-1}	-0.247 ***	(-58.900)	-0.247	(-58.890)
<i>Short-Term Effect</i>				
Δ Conflict _t	-0.009 ***	(-9.740)	-0.010 ***	(-9.760)
Δ Conflict _t * Defence _t	-		0.003 *	(1.780)
<i>Long-Term Effect</i>				
Conflict _{t-1}	-0.003 **	(-2.080)	-0.003 **	(-2.070)
Conflict _{t-1} * Defence _t	-		-0.002	(-1.610)
N. Obs	144519		144519	
R2	0.22		0.22	

Empirical Results

Table 4. Single Equation Error Correction Model of Firm Profitability:
Additional Analysis (1)

	Systemic Effect		Sectoral Effect	
<u>Error Correction Rate</u>				
Profitability _{t-1}	-0.25 ***	(-58.93)	-0.25 ***	(-58.92)
<u>Short-Term Effect</u>				
Δ Interstate _t	-0.01 ***	(-3.91)	-0.01 ***	(-3.92)
Δ Interstate _t * Defence _t	-		0.00	(0.22)
Δ Intrastate _t	-0.01 ***	(-5.24)	-0.01 ***	(-5.25)
Δ Intrastate _t * Defence _t	-		0.00	(0.97)
Δ Extrastate _t	-0.04 ***	(-8.77)	-0.04 ***	(-8.78)
Δ Extrastate _t * Defence _t	-		0.01 *	(1.85)
<u>Long-Term Effect</u>				
Interstate _{t-1}	0.00	(-1.59)	0.00	(-1.57)
Interstate _{t-1} * Defence _t	-		-0.01 ***	(-4.08)
Intrastate _{t-1}	-0.01 ***	(-3.33)	-0.01 ***	(-3.34)
Intrastate _{t-1} * Defence _t	-		0.01	(1.18)
Extrastate _{t-1}	-0.01	(-1.18)	-0.01	(-1.18)
Extrastate _{t-1} * Defence _t	-		0.00	(-0.48)
N. Obs	144519		144519	
R2	0.23		0.23	

Empirical Results

Table 5. Single Equation Error Correction Model of Firm Profitability: Additional Analysis (2)

	Systemic Effect		Sectoral Effect	
<i>Error Correction Rate</i>				
Profitability _{t-1}	-0.25 ***	(-58.89)	-0.25 ***	(-58.88)
<i>Short-Term Effect</i>				
Δ Duration _t	-0.00 ***	(-4.71)	0.00 ***	(-4.64)
Δ Duration _t * Defence _t	-		0.00 ***	(-2.97)
Δ Severity _t	-0.00 **	(-2.15)	0.00 **	(-2.14)
Δ Severity _t * Defence _t	-		0.00	(-1.08)
Δ PProximity _t	-0.00	(-1.40)	0.00	(-1.38)
Δ PProximity _t * Defence _t	-		0.00	(0.48)
Δ FProximity _t	0.00 ***	(3.84)	0.00 ***	(3.77)
Δ FProximity _t * Defence _t	-		0.00 **	(2.01)
<i>Long-Term Effect</i>				
Duration _{t-1}	0.00 ***	(-4.54)	0.00 ***	(-4.53)
Duration _{t-1} * Defence _t	-		0.00	(-0.35)
Severity _{t-1}	0.00 ***	(-3.38)	0.00 ***	(-3.36)
Severity _{t-1} * Defence _t	-		0.00 ***	(-3.40)
PProximity _{t-1}	0.00	(0.74)	0.00	(-0.31)
PProximity _{t-1} * Defence _t	-		0.00	(-1.43)
FProximity _{t-1}	0.00 ***	(7.43)	0.00 ***	(7.39)
FProximity _{t-1} * Defence _t	-		0.00	(1.43)
N. Obs	144519		144519	
R2	0.22		0.22	

Discussion

- War impacts firm profitability
 - Some caveats
 - The systemic effect of war is more pronounced and robust than its sectoral effect
 - The short-term effect of war is more pronounced and robust than its long-term impact
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